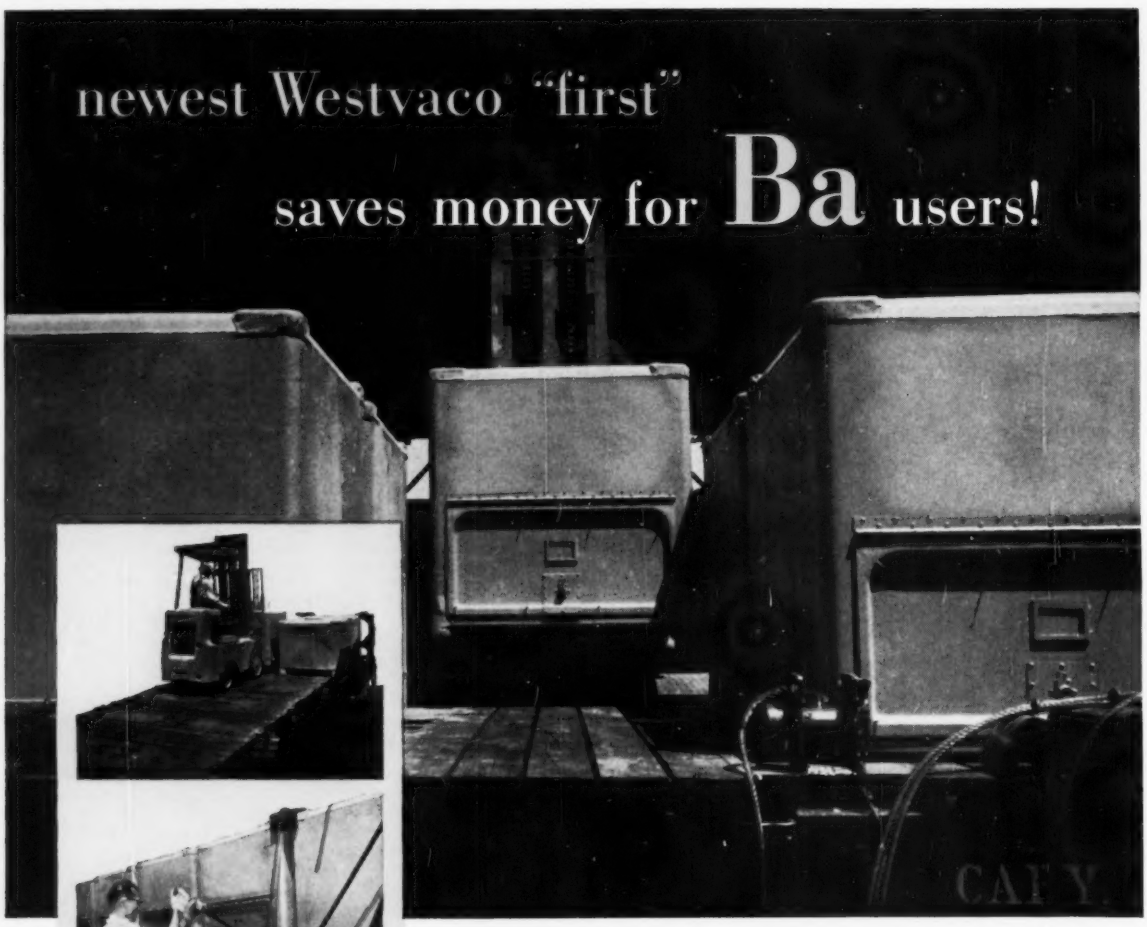
A McGRAW-HILL PUBLICATION

Chemical Week

May 23, 1959

newest Westvaco "first" saves money for Ba users!



Illustrations show 5,000 lb. capacity bins being loaded on flat car. Bins have feet which fit in slots to hold them securely in place. When car is fully loaded, cables are tightened and it's ready to roll.

Like many other Westvaco customers, you might be able to realize substantial savings on barium chemicals in these easy-handling, moisture-tight shipping and storage bins. Your nearest Westvaco office will gladly assist in estimating the possible economies in terms of your specific operation.

This modern, money-saving package is the most recent in a series of customer-minded product and service innovations in Westvaco Barium that result from our years of experience.

Through the years we have cooperated with lube oil and other barium users to pioneer new products best suited to their needs. As a result, we offer the widest range of barium products made, backed by fully integrated production and an unmatched record of dependability.

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION ®

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
Westvaco Mineral Products Division

General Sales Offices:
161 E. 42nd STREET, NEW YORK 17

Photo courtesy Ohio Rubber Company, Willoughby, Ohio, a division of The Eagle-Picher Company

How's this for a surefire success?

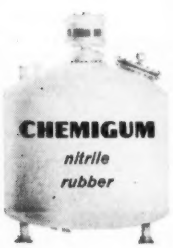
This thimble-size shield works inside an automobile engine. It clings to a pulsing valve stem, prevents excessive loss of engine oil–yet allows enough oil to properly lubricate the stem. Obviously, a tough job for a tiny part.

To do this critical job, rubber seemed the likely choice. But it would have to be a very special kind of rubber. It would have to withstand constant contact with oil, intense vibration and compression, wide temperature extremes and great tension.

Material selected: CHEMIGUM, the nitrile rubber that maintains its dimensional stability under blistering-hot oil attack and the most demanding conditions. Hundreds of thousands of these valve stem shields are now in use – meeting every operational requirement. And the constant uniformity plus the easy processability of CHEMIGUM make their production practical and profitable.

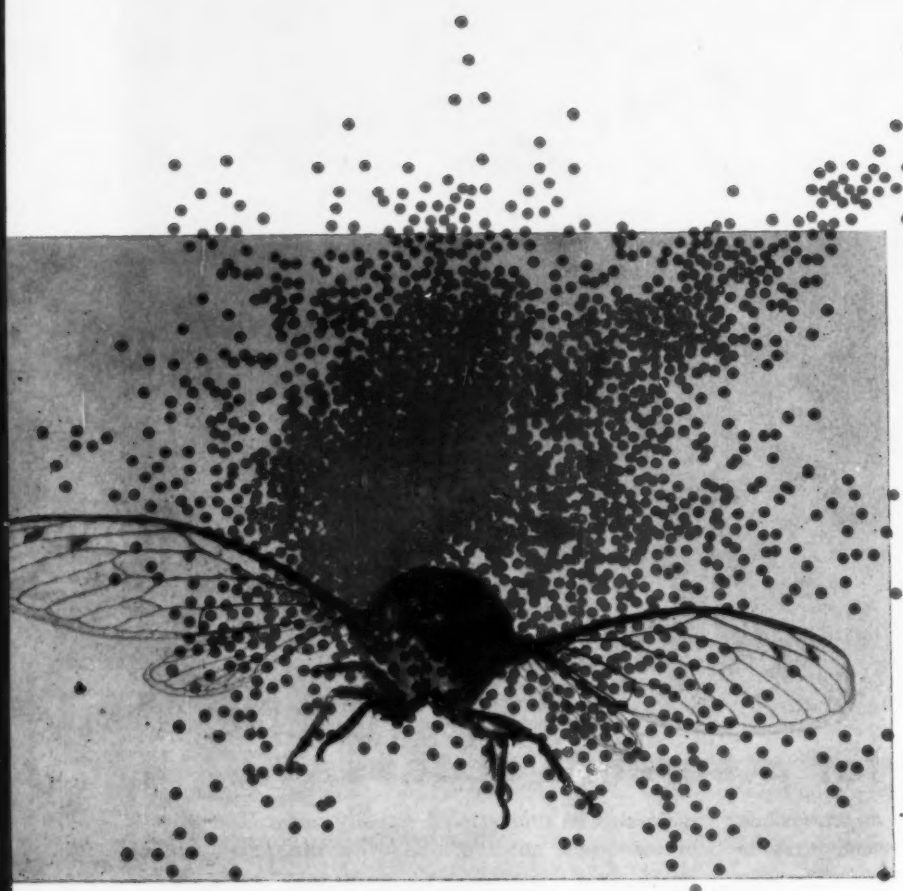
What can CHEMIGUM do for your product? For full details – including latest *Tech Book Bulletins* – and technical assistance on CHEMIGUM and a complete line of rubber chemicals and synthetic rubbers, write:

Goodyear, Chemical Division, Dept. E-9417
Akron 16, Ohio.



GOODYEAR
CHEMICAL DIVISION

Chemigum–T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



INSECTICIDES? YOU CAN MAKE THEM BETTER WITH GULF BENZENE

Gulf's new plant at Port Arthur, Texas, will soon be producing nitration grade benzene of the highest purity and uniformity. Toluene will also be available.

If you manufacture insecticides or plastics or rubber chemicals or *any* product which demands high quality benzene . . . and if reliability of supply is important to you . . . investigate this new basic source. Gulf benzene can be the beginning of a better end product for *you*.
Petrochemicals Department,
Gulf Oil Corporation,
Gulf Building,
Pittsburgh 30, Pennsylvania.

Benzene • Ethylene •
Isooctyl Alcohol • Propylene •
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GULF

Quality Chemica
from Petroleum

Chemical Week

TOP OF THE WEEK **MAY 23, 1959**

▶ **Equipment shortages hobble Soviet chemical expansions**—force U.S.S.R. to go abroad for material ..... **p. 23**

▶ **CPI work experience is best way to interest students** in chemistry as a vocation ..... **p. 67**

▶ **Mixed-bed, ion-exchange resins systems win new favor.** Reason: simple change in installation ..... **p. 76**

▶ **Buckeye Cellulose minimized construction costs** by trying project management-in-depth ..... **p. 85**

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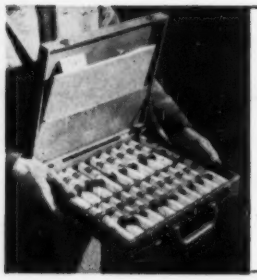


You get lowest cost compounding flexibility with Monsanto's versatile ACL chlorine compounds, detergent phosphates, and SANTOMERSE and STEROX surface-active agents.

Immediate

DRY

BASED ON MONSANTO'S

ACL job-rated properties (where 1 is best)

	Available Chlorine (ave. %)		Solubility	Stability	Low Cost*
ACL 85	$(CINCO)_3$	90	3	3	1
ACL 70	$Cl_2H(NCO)_3$	70.6	4	3	2
ACL 60	$Cl_2Na(NCO)_3$	61	1	2	3
ACL 59	$Cl_2K(NCO)_3$	59.6	2	1	4

*based on cost per pound of available chlorine

Monsanto's versatile ACL line of chlorinated cyanuric acids gives you low-cost formulating "flexibility" to achieve the properties you want most. In nearly three years of commercial use, job-proved ACL compounds have stimulated sales of machine dishwashing products, chlorine scouring powders, industrial sanitizers and of dry bleaches for home and commercial laundries. With four ACL compounds, Monsanto can draw on this experience plus knowledge gained in five years of intensive research to help you formulate for new growth.

All four ACL compounds are ready for you now in quantity. If you make any bleach or sanitizing product—or are considering one of the many product opportunities in this field—you'll want to investigate what the ACL line can do. For a quick start, check the advantages described in the applications shown here. Then write on your company letterhead for working samples and technical help.

For household- and commercial-laundry dry bleaches, ACL compounds outperform older dry-type agents in efficiency, are safe for cotton and modern synthetic fabrics, do not cause pinholing. With ACL, you can market a dry bleach *fully equivalent* to sodium hypochlorite solutions in bleaching and sanitizing performance; and it's easier to store and ship, virtually mistake-proof to use.

For machine dishwashing compounds, ACL formulations are more stable and stay free flowing longer than conventional dishwashing formulations. Fast-dissolving ACL works well with Monsanto's sodium tripolyphosphate to clean china safely and shine glassware without filming or water-spotting.

opportunities for profitable new sales

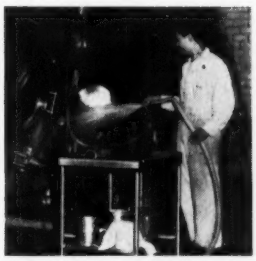
BLEACHES AND SANITIZERS

VERSATILE ACL LINE

(available chlorine)

An ACL compound can deliver the one "best balance" of efficient available-chlorine action, solubility, stability, and economy for each dry bleach and sanitizing product you can make. New and improved dry products based on ACL offer you an immediate opportunity for fast, profitable growth in expanding fields.

For low-cost chlorine scouring powders, you can use more functional fillers in formulations based on ACL than in those based on less concentrated chlorine carriers. And packaged ACL formulations lump and cake less under varying temperature and humidity.



For industrial sanitizing compounds, ACL gives you the most formulating flexibility of all dry-type available-chlorine carriers—greater safety, convenience and ease of storage than liquid sanitizers. ACL sanitizers with detergent properties are used in dairies (see photo), food processing plants, hospitals.

ACL, SANTOMERSE, STEROX: *Monsanto T. M.'s Reg. U. S. Pat. Off.*

For more details use the convenient coupon

Monsanto

Monsanto Chemical Company
Inorganic Chemicals Division
Dept. 91-A, St. Louis 66, Missouri

Please send me technical literature on ACL.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

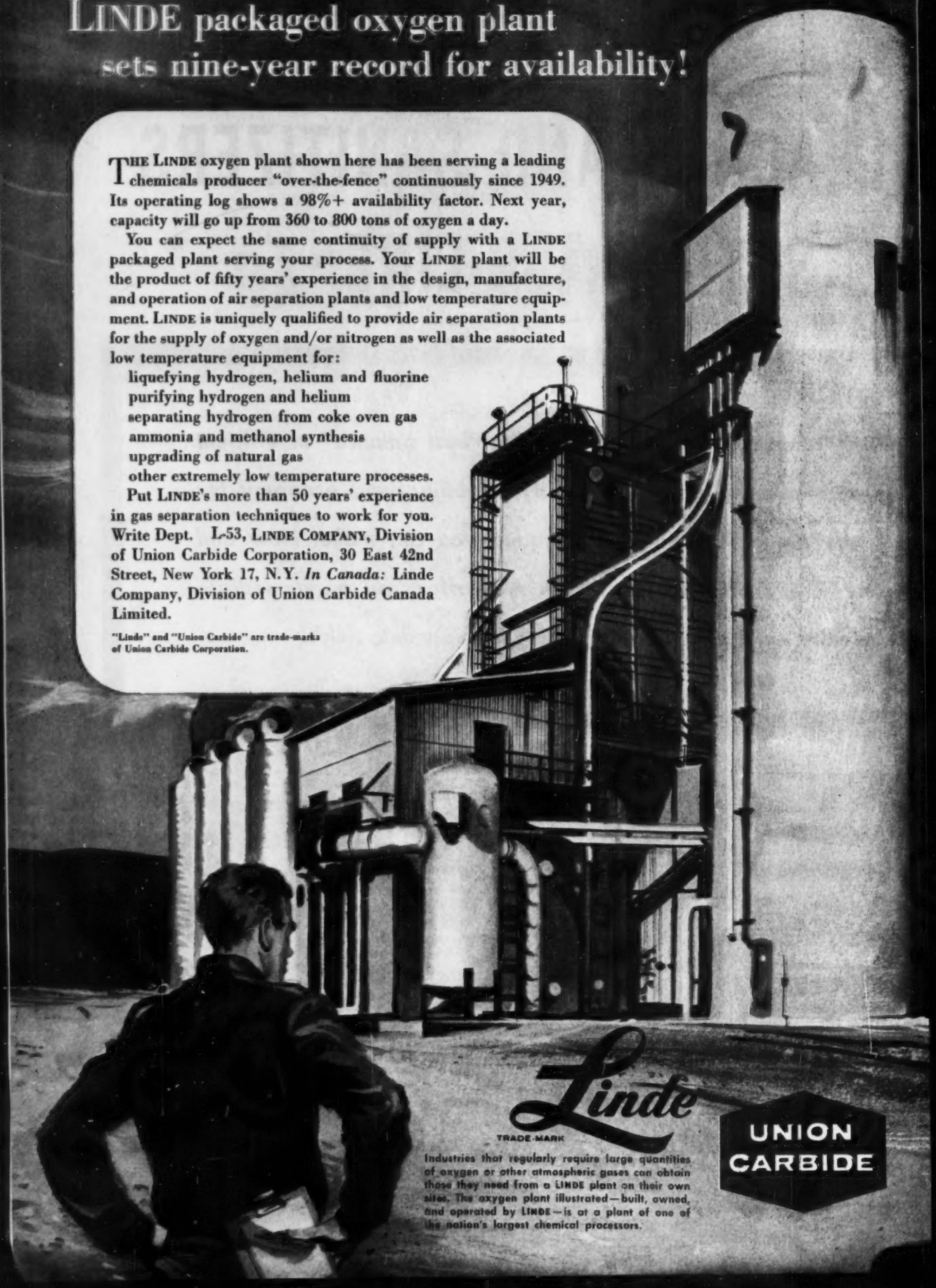
LINDE packaged oxygen plant sets nine-year record for availability!

THE LINDE oxygen plant shown here has been serving a leading chemicals producer "over-the-fence" continuously since 1949. Its operating log shows a 98%+ availability factor. Next year, capacity will go up from 360 to 800 tons of oxygen a day.

You can expect the same continuity of supply with a LINDE packaged plant serving your process. Your LINDE plant will be the product of fifty years' experience in the design, manufacture, and operation of air separation plants and low temperature equipment. LINDE is uniquely qualified to provide air separation plants for the supply of oxygen and/or nitrogen as well as the associated low temperature equipment for:

liquefying hydrogen, helium and fluorine
purifying hydrogen and helium
separating hydrogen from coke oven gas
ammonia and methanol synthesis
upgrading of natural gas
other extremely low temperature processes.

Put LINDE's more than 50 years' experience in gas separation techniques to work for you. Write Dept. L-53, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.



Linde
TRADE-MARK

UNION CARBIDE

Industries that regularly require large quantities of oxygen or other atmospheric gases can obtain those they need from a LINDE plant on their own sites. The oxygen plant illustrated—built, owned, and operated by LINDE—is at a plant of one of the nation's largest chemical processors.

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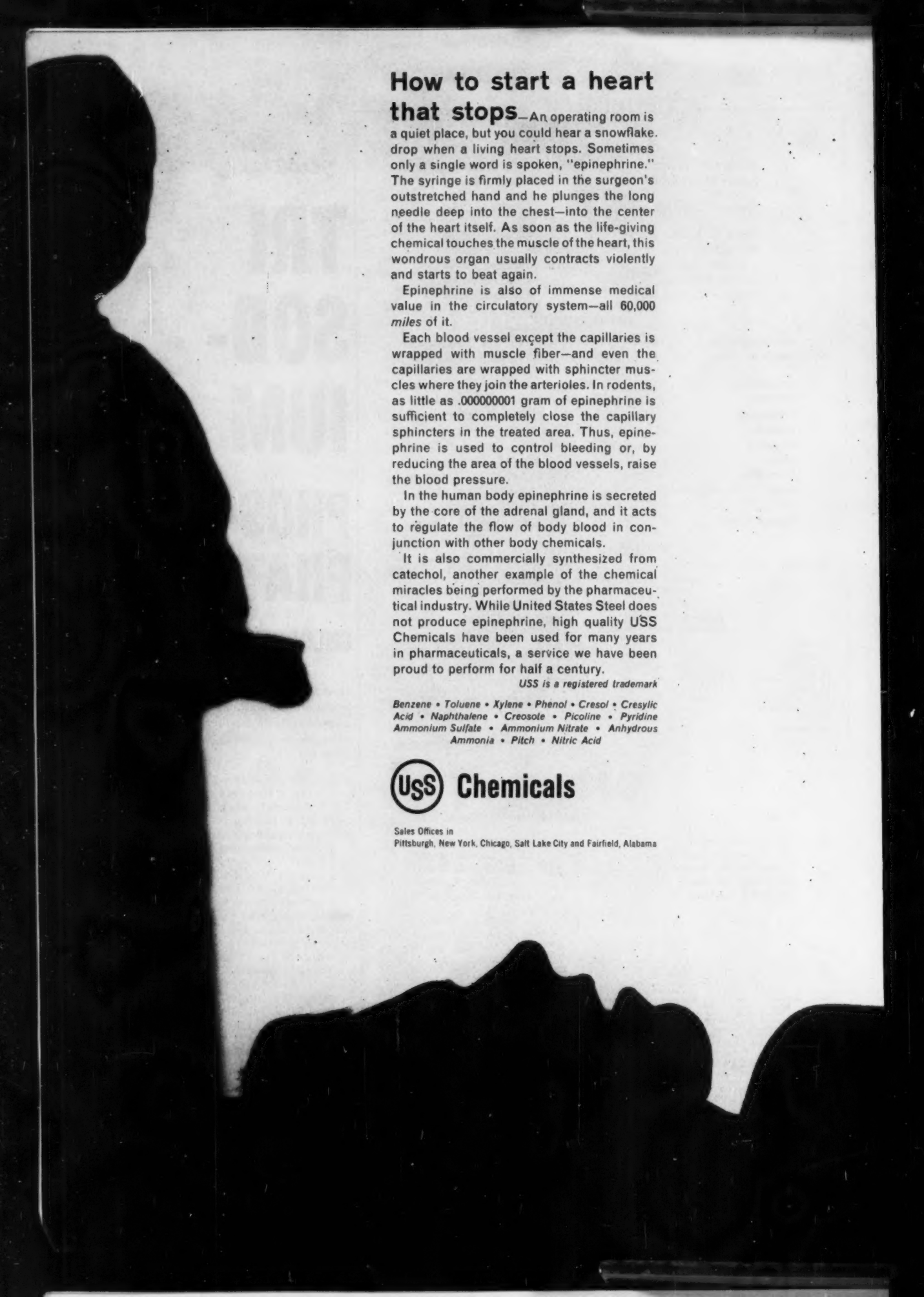


How to start a heart that stops

—An operating room is a quiet place, but you could hear a snowflake drop when a living heart stops. Sometimes only a single word is spoken, "epinephrine." The syringe is firmly placed in the surgeon's outstretched hand and he plunges the long needle deep into the chest—into the center of the heart itself. As soon as the life-giving chemical touches the muscle of the heart, this wondrous organ usually contracts violently and starts to beat again.

Epinephrine is also of immense medical value in the circulatory system—all 60,000 *miles* of it.

Each blood vessel except the capillaries is wrapped with muscle fiber—and even the capillaries are wrapped with sphincter muscles where they join the arterioles. In rodents, as little as .000000001 gram of epinephrine is sufficient to completely close the capillary sphincters in the treated area. Thus, epinephrine is used to control bleeding or, by reducing the area of the blood vessels, raise the blood pressure.

In the human body epinephrine is secreted by the core of the adrenal gland, and it acts to regulate the flow of body blood in conjunction with other body chemicals.

It is also commercially synthesized from catechol, another example of the chemical miracles being performed by the pharmaceutical industry. While United States Steel does not produce epinephrine, high quality USS Chemicals have been used for many years in pharmaceuticals, a service we have been proud to perform for half a century.

USS is a registered trademark

Benzene • Toluene • Xylene • Phenol • Cresol • Cresylic Acid • Naphthalene • Creosote • Picoline • Pyridine Ammonium Sulfate • Ammonium Nitrate • Anhydrous Ammonia • Pitch • Nitric Acid

USS **Chemicals**

Sales Offices in
Pittsburgh, New York, Chicago, Salt Lake City and Fairfield, Alabama

Checked your caustic costs lately?

. . . upon request, a Wyandotte technical-service man will survey your requirements — help you decide if a switch from 50% to 74% caustic is economical

An increase in your caustic requirements, or a change in freight rates can alter your economic position almost overnight in regard to 50% or 74% concentrations. That's why it's wise to check your caustic costs periodically.

Here's an easy way to check: first, using the chart on the opposite page, plot your position in terms of annual requirements and freight rates to see if a saving is possible by switching to 74% caustic (send for Wyandotte's handy free guide, "74% or 50% caustic soda, which for you?" for more complete details). Then, with a basic understanding of your economic position, call in a Wyandotte technical-service man. Together you can analyze all the factors: the cost of concentration; end use of the caustic soda; existing storage and handling facilities; quantity of caustic consumed; plant location.

The results may reveal no savings at all by switching to 74% liquor, or you could save thousands of dollars. In either case, the assistance of a technically trained Wyandotte representative with his familiarity in all phases of caustic soda storage, handling, and uses is at your disposal . . . and there's no obligation. Get in touch with us today. *Wyandotte Chemicals Corporation, Michigan Alkali Division, Wyandotte, Michigan. Offices in principal cities.*

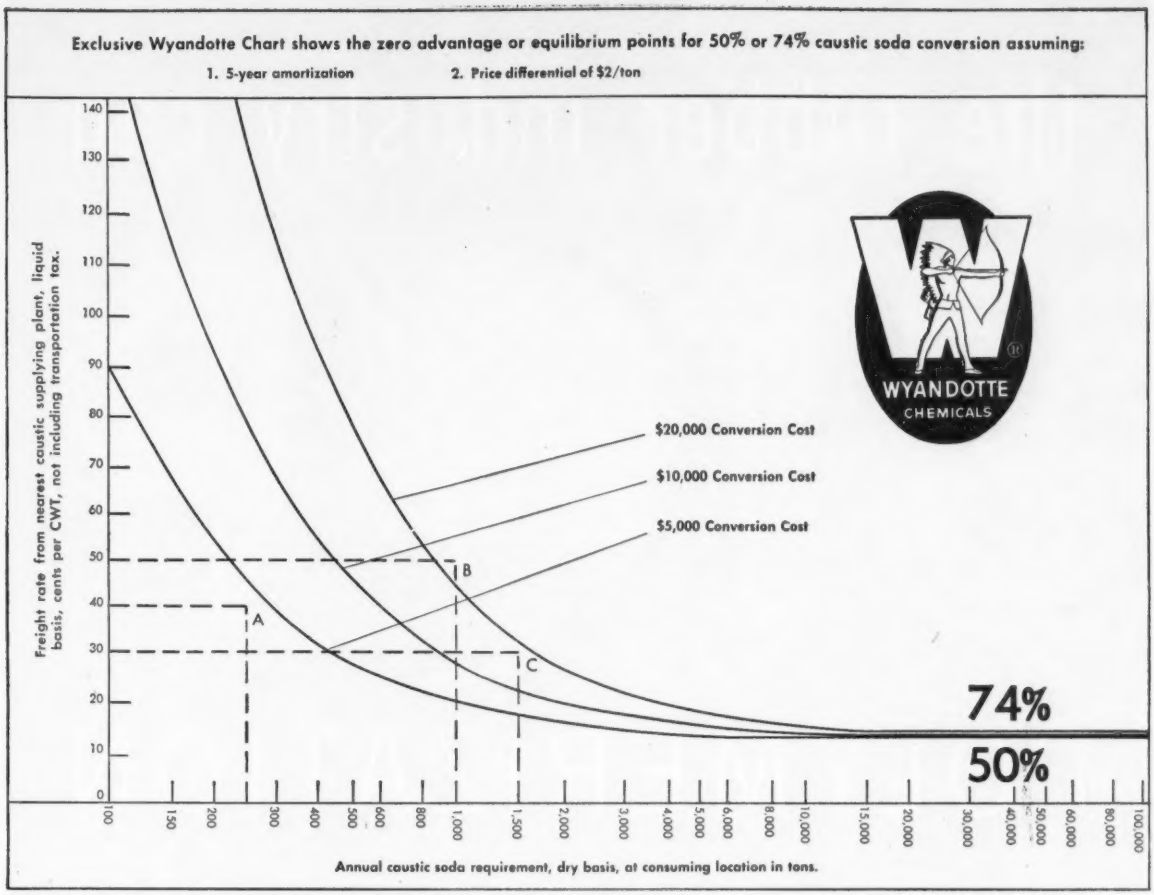
Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

PACING PROGRESS WITH CREATIVE CHEMISTRY

1 After plotting your economic position on Wyandotte chart, call in your Wyandotte technical-service man. This study may bring to light savings of thousands of dollars in freight charges by changing to 74% liquor.

2 Wyandotte engineers — with broad experience in applications of caustic soda and the correct equipment for its proper handling — assist in designing heat exchangers, cooling tower piping, storage tanks, and materials of construction.



HOW TO USE CHART

EXAMPLE A: Freight from nearest producing point to consuming point is 40 cents per hundredweight. Annual consumption by consuming plant is 250 tons caustic soda, dry basis.

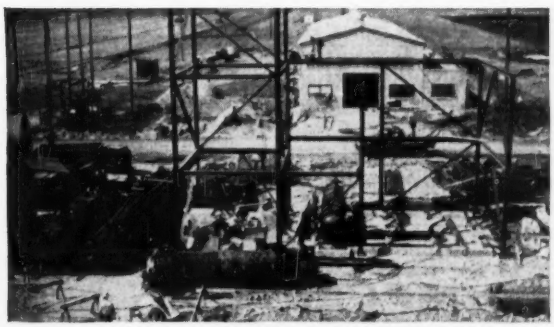
ANSWER: Because Point A lies to the left of the curves, the plant should purchase caustic soda as a 50% liquid.

EXAMPLE B: Freight from nearest producing point to consuming point is 50 cents per hundredweight. Annual consumption by consuming plant is 1000 tons caustic soda, dry basis.

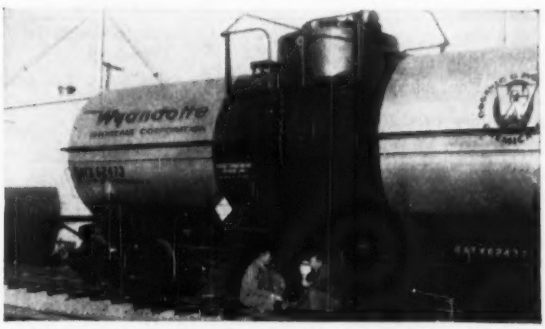
ANSWER: Because Point B lies to the right of the curves, the plant should purchase caustic soda as a 74% liquid, even though additional equipment investment of as much as $20,000 might be found necessary.

EXAMPLE C: Freight from nearest producing point to consuming point is 30 cents per hundredweight. Annual consumption by consuming plant is 1500 tons caustic soda, dry basis.

ANSWER: Because Point C lies between the $10,000 curve and the $20,000 curve, the plant should purchase 50% caustic soda if the additional investment necessary exceeds about $15,000, or should purchase 74% caustic soda if the additional investment is less than about $15,000.



3 When construction problems arise, such as the location of equipment for most efficient operation or more economical installation . . . alternate valves or new materials of construction . . . the Wyandotte technical-service man is available for advice.



4 The Wyandotte technical-service man is on hand to help unload the first tank car of 74% caustic . . . seeing that the outlet leg is properly steamed, diluting water correctly proportioned, temperature controlled, safety precautions followed.

More Facts on Lepetit

TO THE EDITOR: I read with the greatest interest the article titled "Italian Expansion—New Challenge for U.S. Drugmakers" (*CW, May 2 p. 76*).

I think that the worldwide activities of our group were, generally speaking, very well reviewed. However, there is some additional information I am taking the liberty of calling to your attention.

Although, as you reported, Ledoga's capitalization is now $10 million, we are planning an increase to $12 million. Obviously, the nominal capital does not reflect the true worth of the company. Our annual sales are now substantially in excess of $50 million.

While our Mexican manufacturing operations are new, our group's activities and cooperation with local Latin-American interests date back to 1890 — primarily in tanning extracts. The first exports of Lepetit pharmaceuticals to South and Central American countries (including Cuba and Mexico) started around 1920.

The "central research organization" established in '56, to which you refer, is the new research organization of the parent company, Ledoga. Among the areas it explores are sugar chemistry, polyester resins and transparent materials, furfural and its derivatives, starch-converting enzymes, and dietetic products.

Ledoga-Lepetit's pharmaceutical research organization has existed since 1900, when Robert Lepetit developed such original synthetic specialties as sodium *p*-ethoxy phenylamidomethane sulfonate and hematoxilyne. The size of this group has been enormously increased since World War II and includes 500 university graduates. It now supports our group's production of drugs, antibiotics, steroids, hormones, veterinary products, animal feed supplements and growth factors.

While you mention our relationship with Schering, Lepetit also shares an Italian manufacturing subsidiary with Dawe's Laboratories of Chicago. In Europe, Lepetit recently set up a production enterprise owned jointly with Ciba (Basle).

In view of the actual and potential competition from Communist countries, where labor is practically unpaid and the governments are free to do any sort of dumping—fixing also rates of exchange *ad libitum*, Dr. Zerilli is convinced that non-Communist nations' competitive forces need be kept alive and sharp. And that industrial forces must aim at progressive reduction costs by cooperating more and more in the areas of mutual arrangements, research, techniques and production in order to reduce duplication and dispersion of energy and money.

My best congratulations to your staff.

MARIO MORSELLI
Vice-President
Ledoga-Lepetit, Inc.
New York

CW *thanks Reader Morselli for these valuable addenda on the Ledoga-Lepetit group. Our story was in process for well over a year, and involved interviews with the group's headquarters personnel in Milan, with its U.S. representatives, and with officials in Mexico City.*—ED.

Capital Cost Reduction

TO THE EDITOR: The article "Polyurethanes Aim High" (*CW, April 4, p. 21*) mentions savings of from less than 1¢ lb. up to 5¢ lb. gained by eliminating the polyether prepolymer step in favor of the "one-shot" process.

Leading manufacturers of isocyanates, polyether prepolymers, as well as the urethane foam manufacturers themselves, have given us estimates of savings in the range of 5¢-20¢/lb. of foam produced one-shot vs. prepolymer. These savings result from reduced capital investment (no prepolymer kettles and less extensive curing facilities) as well as reduced labor requirement.

The one-shot process holds other attractions for the foam manufacturer in addition to the purely monetary aspect. These include such items as the relative simplicity of processing, and elimination of problems of prepolymer batch reproducibility and shelf life.

At present, the one-shot polyether technique is out of research and into substantial production in a number of companies. One of the "Big Three" in isocyanates production es-

RUSSIAN LAB EQUIPMENT imports for sale to schools and colleges has, most recently, been attacked by Oklahoma University's Horace H. Bliss. A statement distributed by the Scientific Apparatus Makers Assn. quotes Bliss as saying the Russians are frantically trying to dump lab equipment in this country "to gain entrance into our vulnerable academic circles."

The microscopes, projectors, electronic demonstrators and other goods "sold at about one-third the comparable price of so many American-made instruments," Bliss says, "[are] obviously not trade weapon[s] but dangerous propaganda. . . ."

"It is high time that educators throughout the country wake up to the fact that you can't do business with Russians under the guise of cultural exchange."

Now wait a minute, Dr. Bliss. U.S. educators—and those in industry who feel it is to their enlightened self-interest to support education by contributions—are certainly not asleep to the problems here. And if our academic circles are indeed vulnerable, it is because, in these inflationary days, they're trying to make do with budgets that are too small.

But when it's a question of either using an adequate number of Russian instruments or an inadequate number of somebody else's, there is only one possible answer.

We're happy to note that a Senate subcommittee is about to look into this broad question. But, frankly, we don't expect too much to result.

So here's a solution that may be more practical: Why don't some chemical companies and other industrial firms get their office and plant managers to check with local schools to find out their equipment needs? Collate these on a company-wide basis. Then, working with the money the company allocates to aid-for-education, negotiate with U.S. apparatus makers for the equipment. Large-volume purchases like this should help U.S. apparatus makers cut their costs.

H. C. Johnson
Editor-in-Chief

OPINION

timates that, by the end of '59, 75% of U. S. urethane foam production will be polyethers produced via one-shot technique.

P. A. BURGHART
Director of Chemical Sales
Houdry Process Corp.
Philadelphia

Retirement Activities

TO THE EDITOR: In his letter in the May 2 issue of CHEMICAL WEEK, Mr. Angus Blakely suggests that the retired chemist (or chemical engineer) could do useful work in the area of literature research (and the like).

I retired from Haveg Corp. at the end of 1953 at the age of almost 72. Since then, I have received from Haveg a package every week containing the newest magazines in, or of interest for, the plastics field for review. I return them a week later with the articles of interest marked to the attention of the proper persons. This not only keeps my interest alive but also should save the active chemists, etc., a lot of valuable time!

Since I also live opposite the campus of the University of Delaware, I have done literature search projects as suggested by Mr. Blakely from time to time. I believe that quite a few retired people with technical training understand such languages as German, Latin, Greek, French and English, and thus can handle projects in these languages — if they concern familiar subjects.

One last point: Since I am now past 72, the social security rule that limits benefit payments if outside income is more than $1,200/year no longer applies to me.

HANS H. LEBACH
15 Kent Way
Newark, Del.

MEETINGS

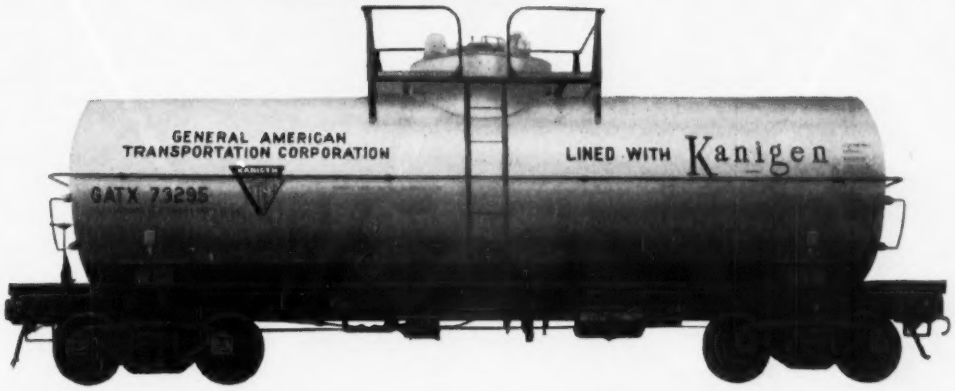
Chemical Institute of Canada, 42nd annual conference, Halifax, N. S., May 24-27.

Commercial Chemical Development Assn., spring resort meeting; theme: additives for petroleum products; Pocono Manor, Mt. Pocono, Pa., May 25-26.

Technical Assn. of the Pulp and Paper Industry, 10th annual coating conference, Statler Hotel, Boston, Mass., May 25-27.

Design Engineering Show and Conference, Convention Hall, Philadelphia, May 25-28.

Biggest plating job on wheels



The interior of this General American tank car is chemically plated by the KANIGEN® process, which deposits a hard, uniform, corrosion-resistant, lifetime nickel alloy coating. You can load at high temperatures. For example, 73% caustic soda can be piped in at unlimited temperatures. GATX tank cars lined with KANIGEN are also being used successfully for liquids such as tetraethyl lead, glycerine, ethylene oxide, resins, fatty acids, glucose, and many others.

Call us about tank cars lined with KANIGEN as well as the many other special GATX cars. Lease from GENERAL AMERICAN without capital investment or operating worries.

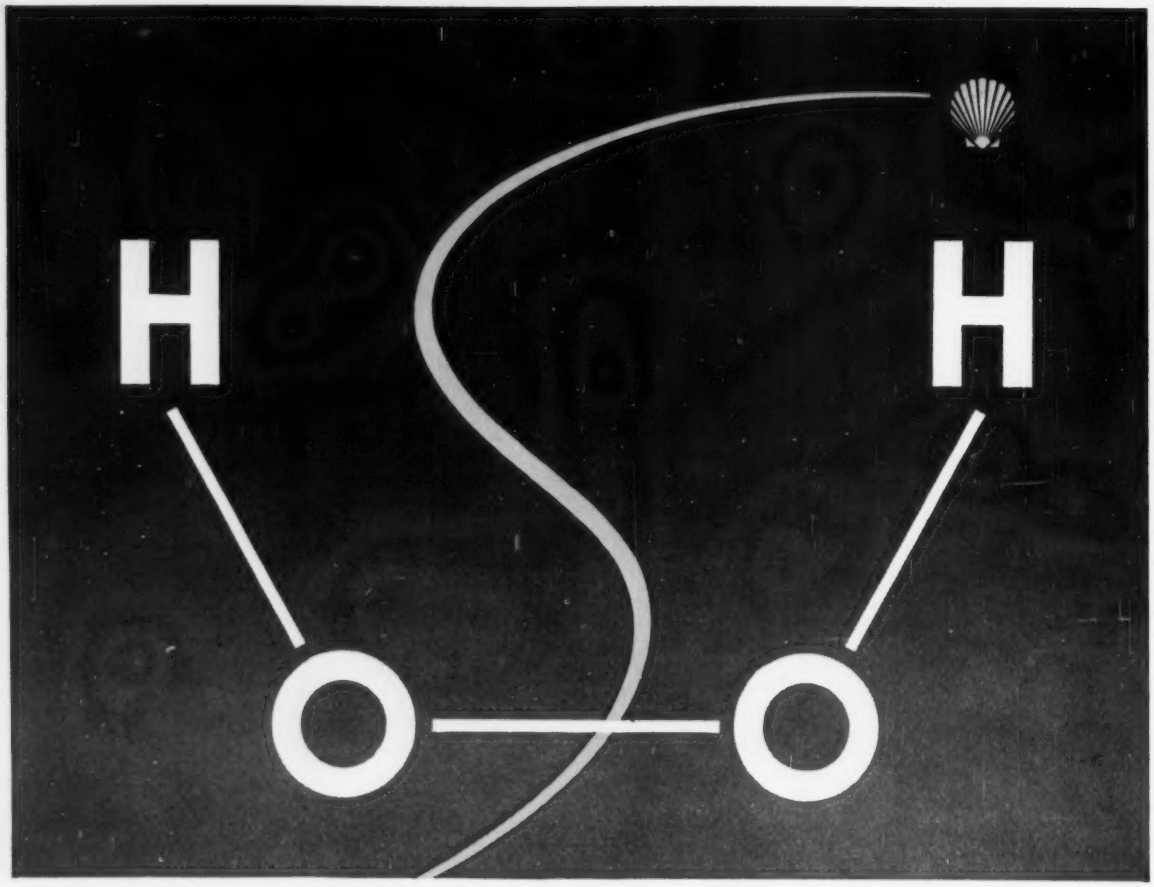
You'll find *it pays to plan with General American.*

Tank Car Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street
Chicago 90, Illinois
Offices in principal cities

GATX GENERAL AMERICAN TRADE MARK

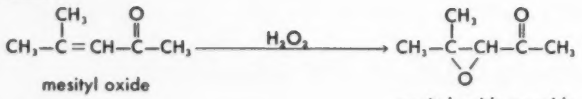


H_2O_2... practical source of oxygen for chemical synthesis

THE LIST of uses for hydrogen peroxide in chemical synthesis is growing steadily. If you manufacture plasticizers, resins, insecticides, or organic intermediates, you will find hydrogen peroxide a ready means for adding oxygen.

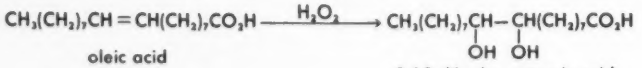
Hydrogen peroxide reacts under a variety of conditions and with a wide range of organic substances. Practical reactions include epoxidation, hydroxylation, peroxidation, and amine oxide formation. Examples are:

Epoxidation



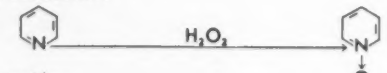
mesityl oxide — mesityl oxide epoxide

Hydroxylation



oleic acid — 9,10-dihydroxystearic acid

N-Oxide Formation



pyridine — pyridine oxide

Shell Chemical's laboratory facilities and field staff are at your disposal to help with problems in using, storing, and handling hydrogen peroxide. Phone or write for more information.

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SHELL

Business Newsletter

CHEMICAL WEEK
May 23, 1959

For the time being, at least, the chemical union merger is off.

In effect, the AFL-CIO's two chemical labor unions decided at Chicago last week that they'll continue to "go steady" but that they still aren't ready to become engaged. Their joint merger committee—20 officers and members from each union—concluded after two days of friendly but unyielding discussions that "there remain honest differences of opinion too substantial to be negotiated away at this time."

Principal hitch: composition of the executive board. Delegates of International Chemical Workers Union advocate a board made up of elected officers; Oil, Chemical & Atomic Workers representatives are holding out for a board in which rank-and-file members, each chosen from his own district, would hold a majority.

Next move will be up to the two unions' conventions, both of which are to be held in Cleveland, starting Oct. 5. Meanwhile, ICWU and OCAW will continue to cooperate in organizing programs, educational conferences, and company-wide councils on bargaining tactics. And although their Chicago deadlock was tantamount to parking the ICWU-OCAW merger express on a rusty siding, delegates to last week's session declaimed on adjourning: "We hope our talks will be viewed in retrospect as a positive contribution toward hastening the day when all workers in our jurisdictions will be joined in membership in one dynamic, militant union."

•

A tragic toll of CPI executives was taken in the mid-air explosion of an airliner last week near Baltimore, Md. All 31 persons aboard died.

Aboard the plane were F. Jack Jeuk, sales vice-president of Interchemical's printing inks division; Maurice Cleary, Interchemical's industrial relations director; Leslie G. Boatright, manager of Escambia Chemical Corp.'s chemical sales development department; Dr. William Gittinger and Dr. Arnold Pensig, medical director and associate medical director, respectively, of Pfizer's Laboratory Division; and Henry Reed, a process engineer with Allied's Barrett Division.

•

Dow Chemical will spend $12 million for new construction at its chemical complex in Plaquemine, La. The program includes a new polyethylene plant, slated for completion in 18 months, and units to produce vinylidene chloride and chlorothene— to be in production by mid-'61.

•

The Houston area continues to be a top choice of CPI executives for relocating plants and offices.

Effective June 1, Gulf Oil Corp.'s manufacturing department will shift its headquarters from Pittsburgh to Houston, as part of the company's move toward "decentralized operations." And United Carbon is also moving a principal office to Houston (*see also p. 69*).

Rohm & Haas is transferring butyl acrylate production from its Bristol, Pa., plant to a larger unit in Deer Park, near Houston.

Phillips Petroleum has just purchased 300 additional acres of Houston Ship Channel property, bringing its total holdings in the area to 1,000 acres. The new property is understood to have been bought for industrial use.

Houston is also getting "serious" consideration as the site for a $20-million polyolefin plastics plant to be built by Hercules Powder—although the company is also studying other tracts on the Texas and Louisiana coasts.

•

Still another Southern port area growing in CPI stature: Tampa, Fla. Tampa has long been the principal shipping point for the state's big phosphate producers, and more recently has been selected as the site for a molten sulfur terminal (*CW Business Newsletter, March 21*). Now, Tennessee Corp.'s U.S. Phosphoric Products Division is planning to build a multimillion-dollar ammonia plant on an eight-acre site adjacent to its present East Tampa facility. Reasons: "The need for ammonia products in our local plant and the increasing use of ammonium phosphates generally."

•

Results of '58 aerosol sales, revealed at this week's annual convention of the Chemical Specialties Manufacturers Assn. at Chicago's Drake Hotel, show sales mounted to about $470 million vs. $390 million in '57. Hair sprays again held the lead; more than 100-million were sold. Insect sprays, room deodorants, coatings and shaving lather were next, with sales of 60 million each.

Adjusted, rather than actual, figures were used because 11 major manufacturers were late with sales results.

•

At weekend, three CPI products were under attack.

• In North Carolina, U.S. Rubber Co.—with strong backing from farmers—is defending its plant growth inhibitor, maleic hydrazide (MH-30), against charges by tobacco companies that this chemical damages tobacco quality.

• In Cleveland, public health officials are asking drycleaners to stop using plastic bags, because of reports that small children have suffocated after pulling the transparent bags over their heads. And Rep. Henry Reuss (D., Wis.) plans to introduce a bill this week to require labeling of plastic bags as hazardous. But the National Institute of Drycleaners says such bags are no more dangerous than other household hazards, such as knives.

• In Washington, the National Heart Institute has warned against use of drugs for babies and pregnant women. NHI says tests on newborn animals shows their central nervous systems are extraordinarily sensitive to barbiturates.

CHEMAGINATION IN THE CONQUEST OF SPACE

On the earth and beneath it are the powers that will liberate man from his planet.

Behind laboratory windows, the chemist marshals these powers in a million ways—building his knowledge of them, testing their might, stirring them to usefulness.

From Hooker laboratories and plants come scores of earth-born products for the space age. A few of them are:

Molten alkali salt purges the surface impurities from titanium and stainless steel, tough missile metals.

Trichlorethylene, highly purified, washes rocket engines clean of the slightest sediment that could trigger a premature explosion . . . yet costs no more than regular trichlorethylene used throughout industry for vapor degreasing.

Fluorocarbon oils reduce friction to an almost incredible minimum in gyro stabilizers that steer a rocket. Greases made with stable fluorine provide a safe corrosion barrier in rocket-fueling lines handling liquid oxygen.

Durez plastics flow into shape as thousands of tiny components for missile guidance and control systems.

Solid oxidants for rockets, researched by Hooker in cooperation with other leading companies, give promise of important new advances in propulsion.

As industry moves into the space era, more and more industries rely on the basic materials we develop and supply in quantity. HOOKER CHEMICAL CORPORATION, 705-2 Forty-seventh St., Niagara Falls, New York.

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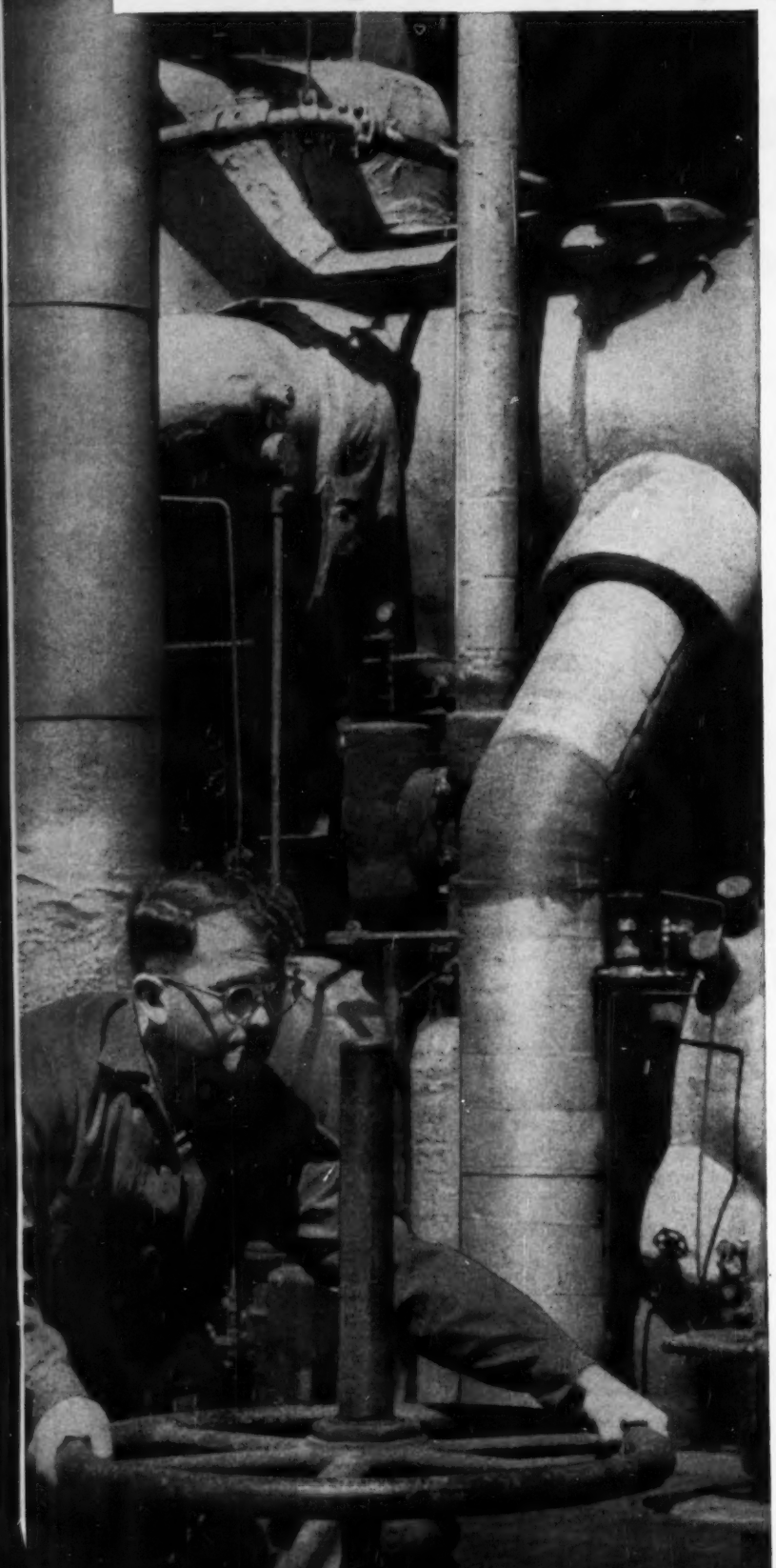


METHYL ISOBUTYL KETONE

Whether you need Methyl Isobutyl Ketone for the production of low-viscosity nitrocellulose lacquers, as a solvent for vinyl resins, or to extract antibiotics from the fermentation bath . . . remember the advantages you get when you order Methyl Isobutyl Ketone from CARBIDE.

You can order in compartment tank car and tank truck shipments or combination drum shipments in carload or truck load lots. Thus, you gain considerable savings in filling all your solvent needs. You're assured quick deliveries from 52 warehouses—one of them is located in your area . . . and from fourteen bulk stations and four plants—at Institute, West Virginia; South Charleston, West Virginia; Texas City, Texas; and Whiting, Indiana.

You can also get valuable assistance from one of CARBIDE's Technical Representatives. With his broad industry experience, the CARBIDE representative can give you complete information on Methyl Isobutyl Ketone as well as other ketones. For example, Acetone is a good solvent for protective coatings, duplicating fluids, and in drug extraction; Di-Isobutyl Ketone can be used in vinyl coatings and nitrocellulose lacquers; and Isophorone is an excellent solvent for vinyl coatings used as linings for food and beverage cans.

For information on applications and specifications for Methyl Isobutyl Ketone and 14 other ketone solvents, write for the booklet, "Ketones." For aid in selecting the proper solvent to strike the best balance between cost and performance in your formulations, send for the handy 6-page booklet "Solvent Selector"; it gives complete data on 70 solvents. Write . . . Department H, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.

UNION CARBIDE CHEMICALS COMPANY

DIVISION OF UNION CARBIDE CORPORATION

Chemical Week — May 23, 1959

New try for commercial coal chemicals

	PROJECT	UPSHOT
Dynamics Reading	'58-present: $500,000 semicommercial unit as forerunner of proposed $100-million gasification plant to produce chemicals from anthracite wastes.	?

Three earlier attempts

	PROJECT	UPSHOT
Olin Mathieson	'56-'58: Prototype coal gasification unit for production of ammonia and methanol.	Plant closed as obsolete and unprofitable; company is now in nitrogen business with Sun Oil.
Du Pont	'54-'56: $4-million conversion to coal gasification for production of ethylene glycol and ammonia.	Coal found to be uneconomic; plant switched to natural gas.
Union Carbide	'52-'56: $11-million, 300-tons/day coal hydrogenation unit for production of numerous organics.	Unit shifted to production of other chemicals; pilot-plant work transferred to smaller (12 tons/day) hydrogenation unit.

Hard Coal's Big Break in Chemicals—Maybe

Two lively, diversified, largely nonchemical companies this week are moving cautiously toward a possible $100-million joint venture in chemicals from coal. If successful, the venture would be credited in CPI annals as a notable tour de force: establishing anthracite coal particles as a major chemical raw material.

One of two companies involved in the venture—Philadelphia & Reading Corp.—has been working on the scheme for years, spurred by the problems afflicting its big hard-coal mining operations in east-central Pennsylvania (*CW, Feb. 23, '57, p. 70*).

The other partner—General Dynamics Corp.—is a newcomer to this project. GD has achieved size and fame in such industrial fields as electronics, nucleonics, aircraft, missiles and nuclear submarines; but it has been eager to balance its heavy defense revenues with more substantial commercial sales. One step in this direction was its acquisition of Liquid Carbonic Corp. (*CW, Oct. 12, '57, p. 49*). The proposed joint venture with Philadelphia & Reading would be another boost for its nonmilitary income.

Sidelight—a possible third step is also in the chemical domain: GD reportedly has been dickering to take General Aniline & Film off the government's hands.

Numerous Products Planned: In essence—and that's about all there is to the plan so far—these two companies' idea is to take anthracite silt, oxygen and steam, react them in the Lurgi version of the partial combustion process (*table, p. 22*), and from the resulting synthesis gas produce and market a wide range of chemicals: hydrogen, ammonia, ammonium nitrate, urea, nitrogen solutions and methanol. Also, some anthracite residue would be reacted with limestone to produce calcium carbide, acetylene and vinyl chloride.

The joint subsidiary would be known as Dynamics Reading Chemicals, Inc., and management and sales responsibility would be under the jurisdiction of Rex Nicholson, president of GD's Liquid Carbonic Division. The plant would be built at Pottsville, Pa., a 23,000-population mining center about 75 miles northwest of Philadelphia. Pottsville is home base for P&R's Reading Anthracite Divi-

sion, leading U.S. hard-coal producer.

Status of this proposed joint venture is that it has been agreed to "in principle" by both parent companies' boards of directors. But it appears that there'll be no firm go-ahead unless and until the directors receive favorable reports on "certain explorations" now under way.

Risky Trail-Blazing: If Dynamics Reading materializes and makes a go of its processes, its success would be more of a dollars-and-cents coup than a technological achievement. The point is that various people have been making chemicals from anthracite on a smaller scale and have reported good results; but up to now, the whole field of chemicals - from - coal — excluding those very sizable chemical manufacturing operations that start with coke-oven by-products—has been pretty much a graveyard for lofty hopes (*chart, p. 21*).

Research Continues: Even on the research level, well-supported attempts in this field have never been crowned with success. Perhaps one of the most significant case histories is that of Consolidation Coal Co.* (Pittsburgh), one of the soft-coal industry's leaders in every respect, which has been working diligently for some 20 years with the low-temperature carbonization process developed by its own men.

Back in '52, Consol moved much of this research out of the laboratory and into a specially built pilot plant that was operated intensively through 1953-54. Consol's plan at that time: carbonization of fluidized coal to produce char and high yields of valuable tar liquids, and refining those liquids into marketable chemicals.

The next year, Consol bought Reilly Tar & Chemical's coal-tar chemical plant in Newark, N.J., and seemed ready to put its plan into commercial operation. A year later, in '56, Consol was thinking of something still bigger: a $25-million works in West Virginia that would carbonize coal (2.5 million tons/year) to produce char for Ormet's new aluminum smelter and 65 million gal./year of tar liquids to be refined into chemical products.

'Trading With the Enemy': Early in '57, Consol's chemical subsidiary started operating the Newark plant, producing cresylics, cresols and phenols—but from petroleum refinery liquids (to provide manufacturing and marketing experience). And early in '58, Mountaineer Carbon Co.—jointly owned by Consol and Standard Oil Co. of Ohio—began supplying Ormet high-quality calcined carbon—made from petroleum coke.

Then, early in '59, Consol told its stockholders: "In line with this overall concept [that fuel uses of coal hold best prospects; that the chemical field offers potential additional profit] an agreement was concluded between Standard Oil of Ohio and your company to undertake a joint research project to explore methods of manufacturing hydrocarbon liquid fuels from coal."

Technical Feasibility: Chemicals-from-coal operations are going on right along in Germany, Britain, South Africa and Australia, where there is plenty of coal but little or no natural gas or oil; each operation is primarily to produce fuels.

Anthracite has been proved out in both of the processes Dynamics Reading proposes. P&R has had Hydrocarbon Research (New York) trying them in a semicommercial fluidized-bed plant at Trenton, N.J., for more than a year.

Even so partisan a source as Bituminous Coal Research, Inc. (Pittsburgh), however, concedes: "Further developments in research are needed to make products from these processes competitive with similar materials from other sources such as petroleum, natural gas, shale oil and coal carbonization (coking). As for production of synthetic fuels from coal, commercialization may not begin for at least 10 years, [but] the following decade should see substantial increases in synthetic production capacity."

* Formerly Pittsburgh Consolidation Coal Co.

Chemicals From Coal: Six Non-coke-oven Routes

Process	Materials and methods	Principal products
ALKALINE HYDROLYSIS	Pulverized coal plus strong alkali in hot-water solution.	Phenols, aromatic hydrocarbons, ammonia, carbon dioxide, fatty acids.
HYDROGENATION	Crushed coal in oil, plus hydrogen gas, reacted at high temperature and under high pressure.	(a) At 6,000 psi., various aromatic chemicals such as naphthalene, quinoline. (b) At 8,000 psi., various synthetic fuels such as gasoline.
LIMITED OXIDATION	Crushed coal, plus one of certain oxidizing reagents, such as air, nitric acid.	(a) With mild oxidation, various alkali-soluble "humic acids" with condensed cyclic structures. (b) With more severe oxidation, various water-soluble acids such as acetic, oxalic, succinic.
LOW-TEMPERATURE CARBONIZATION	Fine bituminous coal, to 550-600 F, then to 850-900 F in revolving retort.	Coke balls, coal tar (including tar-acid oil, creosote oil, fuel pitch).
PARTIAL COMBUSTION	Pulverized coal, plus oxygen gas and steam, reacted at high temperatures and under various pressures.	Synthesis gas, water gas or fuel gas, etc.—made up largely of carbon monoxide and hydrogen in varying proportions.
SOLVENT EXTRACTION	Crushed coal, plus one of various organic solvents, such as phenanthrene at its boiling point.	Chemicals, waxes, resins, tars, etc.

Smaller Firms Couple Up

Early last week, Unexcelled Chemical Corp.'s new president, James Crosby, emerged from a closed-door conference with news that Unexcelled seeks a stock-swap merger with drug and cosmetic maker R. R. Williams Co. (Canaan, Conn.). It was the first of a raft of CPI acquisitions.

- Purex Corp. disclosed it's acquiring Franklin Research Co. (Philadelphia).
- Flintkote Co. stockholders okayed a plan to take over West Coast gypsum maker Blue Diamond Corp.
- Arner Co. Inc. (Buffalo, N.Y.) and Strong, Cobb & Co. (Cleveland) directors approved plans to merge.
- Stepan Chemical Co. (Chicago) cleared up details of a deal to buy up the voting stock in Maywood Chemical Works (Maywood, N.J.) (*CW Business Newsletter, May 16*).

More Working Capital: Unexcelled is offering Williams one share of common stock for every three shares of the latter's outstanding stock. Williams has a total of 259,000 shares outstanding; Unexcelled, 400,000.

If Williams approves the offer, the Connecticut company would continue to operate as a wholly owned subsidiary with no changes in management.

Said President Crosby: "The offer . . . is beneficial to Williams stockholders in view of the fact that Unexcelled can provide Williams with working capital to increase its advertising, public relations, promotion activity."

He also hinted that other acquisitions are on tap: "This is the first step in a program to revitalize the company. We are also interested in one or two other firms in the chemical and drug fields and have initiated discussion for acquisition."

Specialty Makers Merge: In Purex Corp's (South Gate, Calif.) acquisition of Franklin Research, through exchange of stock, Franklin's Philadelphia headquarters will be retained and the company operated as a wholly owned Purex subsidiary.

Both companies manufacture a broad line of specialty cleaning products. Franklin also manufactures some toiletries and drug sundries. Purex annual sales prior to the merger: about $68 million, with $3/million/year in the industrial field (*CW, April 11, p. 41*). Franklin's annual industrial volume comes to about $6 million.

Diamond into Flintkote: At a special meeting, also held last week, Flintkote Co. stockholders approved plans to acquire Blue Diamond Corp., Los Angeles gypsum producer. The acquisition, effective May 14, calls for each of the 767,603 $2-par shares of Blue Diamond to be converted into a .802 share of Flintkote $5-par common—or a total of 615,617 Flintkote common shares.

Commenting on the merger, Flintkote Chairman I. J. Harvey, Jr., observed: "Blue Diamond's facilities for gypsum product manufacture will complement the present line of Flintkote products on the West Coast."

Drug Firms Double Up: Terms of the merger of Arner and Strong, Cobb call for Strong, Cobb to exchange its common stock for shares in the new firm—to be called Strong, Cobb, Arner, Inc.—on a share-for-share basis. Each of Strong, Cobb's preferred shares would be exchanged for four preferred shares in the new company.

Arner stockholders will receive four shares in the new company for each common share held. The company has no preferred stock. Combined sales of both firms total about $16 million.

Stepan Chemical's decision to buy Maywood Chemical's voting stock was actually reached late last fortnight. However, details were not generally known until last week. Stepan has already acquired more than 80% of the stock, has offered to buy up the rest.

Soviet Chemical Snag

With its seven-year plan under way less than six months, Russia's chemical industry is already showing signs of severe strain in trying to meet goals. As expected (CW, Jan. 3, p. 12), the weakest link in the Soviet's plans is inadequate output of chemical equipment.

Two developments highlight the Russians' mounting concern over the equipment lag. Against a background of $100 million in equipment orders recently placed by the Russians with British producers, a British trade mission arrived in Moscow last week. It is almost certain to discuss extending Soviet credit for more purchases.

And next month the Central Committee—the Communist party's ruling group—will put top chemical industry officials on the carpet to explain why they fell short of important targets.

Trade Talk: The Russians and the trade mission, headed by Board of Trade President Sir David Eccles, are formulating the first Anglo-Russian trade agreement since the short-lived 1947 pact. The new arrangement, Eccles feels, may help keep British bidders on top as the Russians shop for equipment and whole plants.

Russia's pressure for medium-term (probably five-year) credits may cause the British problems with their Commonwealth partners and NATO allies. They are hungry for credit themselves and might well take a dim view of such British generosity to the Russians.

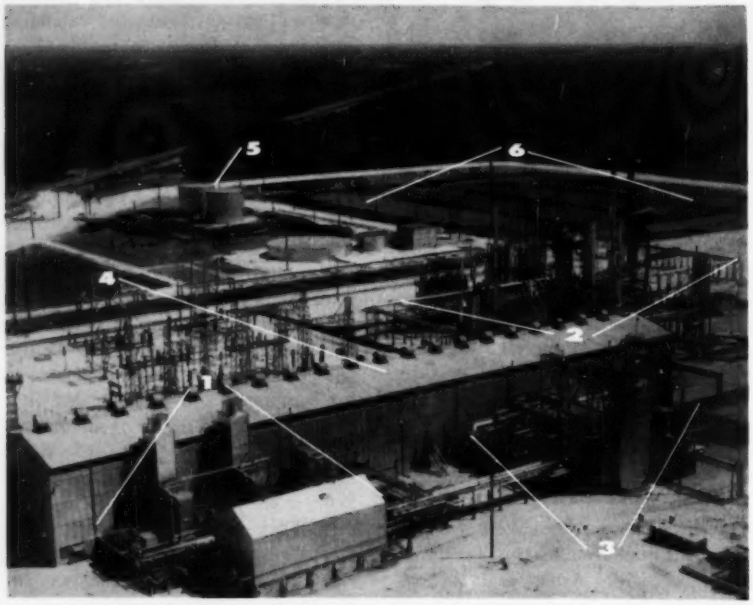
In its eagerness to get Western equipment, Russia is apparently abandoning its policy of maintaining a country-by-country trade balance, along with its policy of cash-on-the counter. These shifts will likely be reflected in the new pact with the British.

On the Carpet: The chemical officials—members of the State Committee on Chemistry—will make their explanations to the Central Committee at its plenary session June 24. With a month-and-a-half notice, *Pravda* comments, the officials will have a chance to eliminate "at once" present shortcomings.

Although over-all chemical output reportedly rose 22% during the first quarter, compared with first-quarter '57 production (*CW Business Newsletter, April 25*), the government asserts that potentialities and resources of the chemical industry are not being fully used.

While the country is short of advanced equipment, the government's organ charges, the largest chemical equipment plant in the Urals is wasting its time making equipment that could be made elsewhere by simpler plants. And far behind schedule is the construction of synthetic fiber and rubber plants in Krasnoyarsk, synthetic resin plants in Leningrad and Gorki, and a synthetic rubber plant in Azerbaijan.

Florida liquid hydrogen plant is world's biggest.



1 Air separation unit, 2 Texaco synthesis gas unit and hydrogen purification, 3 Hydrogen liquefaction and conversion of ortho-hydrogen into para-hydrogen, 4 Compressor building, 5 Fuel oil storage tanks, 6 Lagoons for settling carbon from gas purification.

The Secret of Plant 74

The picture above is the first one ever released by the Air Force of its previously hush-hush liquid hydrogen plant—esoterically designated Air Force Plant 74—in West Palm Beach County, Florida. It provides new insight into the scope of operations there. And recognizable equipment gives a helpful clue to the processes used.

For some time, it had been known that Air Products was building a large liquid hydrogen plant for the Air Force in Florida (*CW Technology Newsletter, Feb. 28, '59; Nov. 30, '57*). But so well had the Air Force disguised the project that the exact area had not been pinpointed (it's 40 miles inland from Palm Beach).

Last week, it revealed (*CW Technology Newsletter, May 16*) that it had three liquid hydrogen plants operating: a Bakersfield, Calif., plant built by Stearns-Roger; an Air Products unit in Painesville, O., and the plant in Florida. Of these three, the one in Florida is largest; it's described as a "tonnage facility."

It seems clear now that the plant can turn out at least 10 million lbs./year, probably more. That would put it at three times the "minimum capacity" of Linde's abuilding Torrance, Calif., plant.

Capital costs of the Florida plant have not been divulged. Newspaper reports said the plant was built under a contract totaling "well in excess of $10 million." But its size and complexity make it nearer $15 million.

From Fuel Oil: The picture indicates the plant starts with a Texaco partial oxidation unit (*number 2, above*). The storage tanks hold fuel oil (5), which is fed to the oxidation section. Oxygen, from the air separation unit (1), converts the oil into carbon monoxide and hydrogen, which are sent through a familiar shift converter to produce more hydrogen and carbon dioxide. The hydrogen must be highly purified to meet the Air Force's description of "undoubtedly the purest hydrogen ever made."

Liquefaction occurs in the cold boxes (3). These are simply large boxes encompassing the processing equipment. They're evacuated and filled with an insulating material such as perlite. The silo adjoining the cold boxes is for storing the perlite, should the equipment need servicing. Special, newly-designed turbo-expanders perform the liquefaction.

One of the cold boxes is needed to convert the ortho liquid hydrogen into the more stable para form. This is undoubtedly accomplished by the Bureau of Standards process which uses a ferric oxide catalyst.

It's quite clear from the electrical supply equipment and the size of the compressor building (4) that the plant consumes prodigious amounts of power. But it's fairly simple to pump energy into a system on the ground. In the case of liquid hydrogen, the release of some of this energy during the rocket's flight helps make it the "ideal" rocket fuel.

Polypropylene Pickup

Hercules Powder Co.—still sole U.S. producer of polypropylene—is planning to increase its production capacity for this resin by 150% while prospective competitors are still abuilding.

Growing sales volume in six major areas, Hercules says, justifies this move. Sales Manager Bill Ullrich says fourth-quarter sales will tally like this: closures and containers, 15%; industrial molding, 20%; film, 15%; housewares, 15%; filament, 25%; miscellaneous, 10%.

Filaments, probably the biggest market, will be helped by growing acceptance of propylene ropes, fish nets, filters and auto seat covers.

Also expected to gain momentum is demand for film, used in bread wrap and other transparent packaging (*CW, May 9, p. 40*).

In the industrial molding field, Detroit auto makers are expected to increase use of polypropylene for new model parts. This year, only about 4 oz. of the plastic is being used in each new car. By '65, predicts Ullrich, this may reach 3-5 lbs.

Hercules' Elmer Hinner backed Ullrich's optimism last week when—speaking to Philadelphia security analysts—he revealed that rising demand for the plastic had prompted Hercules' decision to expand its Parlin, N.J., polypropylene plant to 50 million lbs./year.

COMPANIES

Olin Mathieson Chemical Corp. is shutting down its $5.5-million, company-owned, high-energy fuels plant and is getting ready to open the big $36-million plant it has been building for the U.S. Air Force. Both of these boron-based liquid propellents plants are in the Niagara Falls, N.Y., area. OM says "most or all" of the 125 employees affected by the shutdown will be reassigned.

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Hardifoam Products Ltd., recently formed Canadian firm, will produce polyether foams in Toronto, using a new "one-shot" process.

EXPANSION

Chlorine-Caustic: Olin Mathieson is budgeting "more than $6 million" to expand chlorine-caustic production at Niagara Falls, N.Y. New electrolytic cells will be installed to boost both quality and tonnage. President Stanley Osborne reports the chemical division is changing from 25-cycle to 60-cycle power in the Niagara Falls area, and that the change in power will aid the new electrolytic cell program.

The new cells, which will occupy less space than those now in use, will permit expansion of the company's line of specialty products produced in the Niagara Falls plant. However, Osborne emphasized, there are no specific plans for this now.

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Polyols: Union Carbide Chemicals Co., division of Union Carbide Corp., has doubled polyether polyol capacity at its South Charleston, W. Va., plant. The expansion, reports Carbide, stems from increased demand by urethane foam industry.

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Heavy Water: Atomic Energy of Canada, Ltd., will build a heavy-water fractional distillation plant at Chalk River, Ont., slated for completion this summer.

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Uranium: Globe Mining Co., subsidiary of Union Carbide Corp., will build a 492-tons/day uranium processing mill in the eastern Gas Hills area of Natrona County, Wyoming. The mill will be financed by Union Carbide and operated through its division, Union Carbide Nuclear Co. Construction will begin immediately.

On completion, the mill will supply the Atomic Energy Commission with uranium concentrates through a newly signed contract running until Dec. 31, 1966.

•

Aerosols: S. C. Johnson & Co., Inc., has started construction of a $1-million plant at Waxdale, Wis., to be used for manufacture of the company's aerosol products. The new unit, part of the firm's current $4-million building program, is slated for '60 completion.

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Magnesia: Kaiser Aluminum & Chemical Corp. is mapping a major expansion of its refractory magnesia operations by construction of a $3-million plant at Midland, Mich.

Chief product will be periclase, a dense crystalline magnesia—though other magnesia-containing refractory grains will also be produced.

Initial capacity of the new unit will be 45,000 tons/year of periclase, boosting the company's total capacity for all types of magnesia furnace grains to 165,000 tons/year.

Construction is scheduled to get under way this July; completion date is early '60. The plant will use magnesium hydroxide supplied by Dow Chemical at Midland.

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Phosphorus: Monsanto Chemical will modernize and expand its phosphorus plant at Columbia, Tenn. First to be built are facilities to prevent air and stream pollution, and some units for processing phosphate rock. Completion date for this work is early '60.

FOREIGN

Urea/Germany: Union Rheinische Braunkohlen-Kraftstoff, German oil refiner, is blueprinting a 25,000-tons/year urea plant near Wesseling, Germany. Production is scheduled to get under way by mid-'60. Most of the output will go to German producers of urea-formaldehyde condensation products and fertilizers.

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Aluminum, Petrochemicals/Italy: Montecatini, Italy's biggest chemical firm, will float a $10-million bond issue in the U.S. to help finance expansion of aluminum and petrochemical production and for construction of the Brindisi petrochemical complex in southern Italy. A recent $48-million issue in Italy—for the same purpose—was oversubscribed.

•

Pharmaceuticals/Britain: The British firm Beecham Group Ltd. will build a new pharmaceutical plant at Worthing, southern England. Major products will be modified penicillins evolved from the company's recent isolation of the basic penicillin molecule.

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Petrochemicals/Mexico: Petroleos Mexicanos has signed agreements with a group of French banks for loans totaling $50 million and with a group of Mexican banks for $7.5 million. The funds will finance its oil and petrochemical expansion program.

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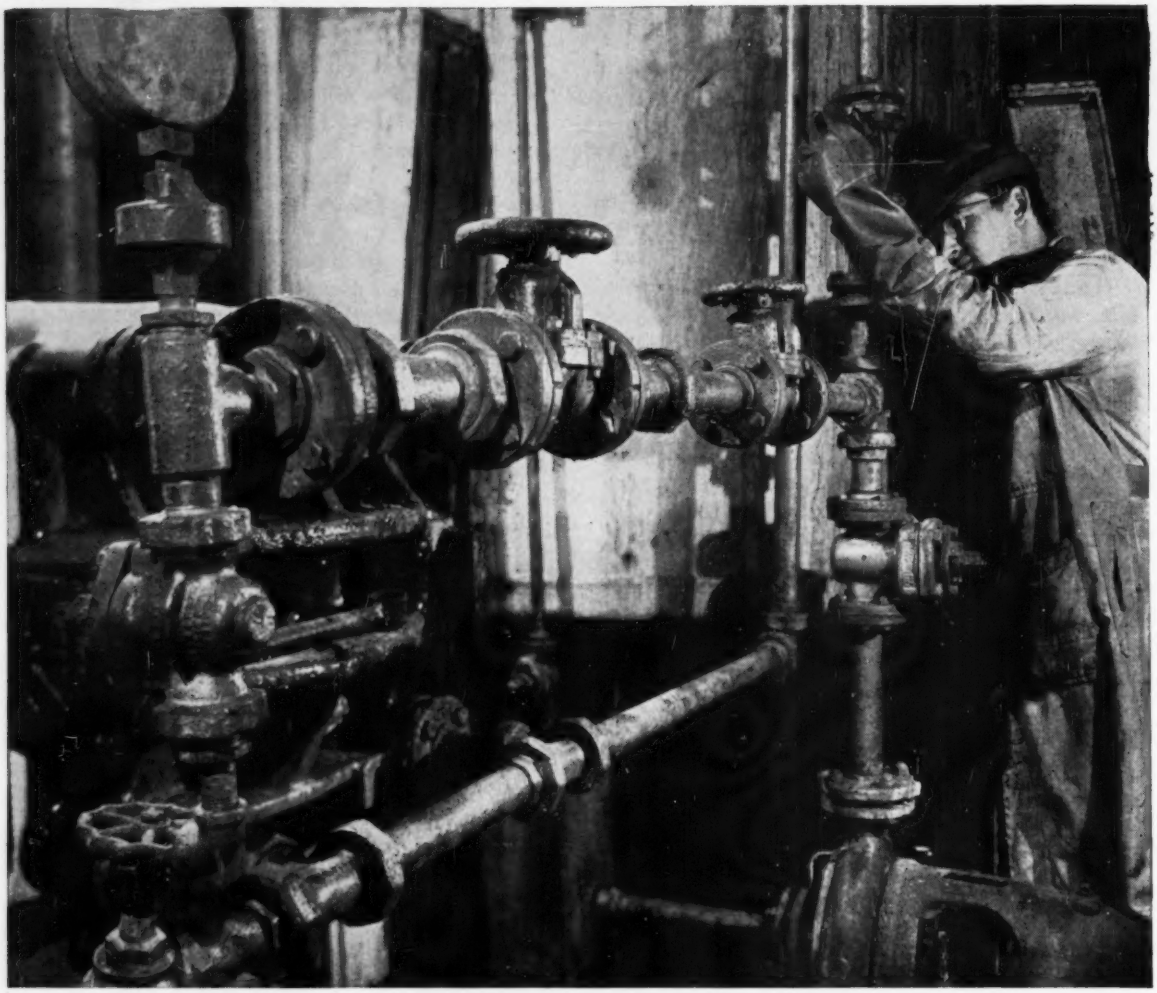
Nylon/United Kingdom: To protect themselves against imports, British textile producers who use nylon are adopting two brandnames registered by British Nylon Spinners Ltd. They have agreed to put a Brinylon label on clothing and household fabrics of British-made nylon and will tag bulked yarns and brushed goods Bri-lon. A major advertising campaign is being planned to promote the names.

DOW | **SARAN LINED PIPE**



After eight years carrying lithium chloride brine . . .

no corrosion in SARAN Lined Pipe

When pipe must carry extremely corrosive lithium chloride brine . . . when floor-level installation freely exposes it to danger of accidental damage from trucks and tools . . . doubly protective SARAN Lined Pipe can mean dependable, low-maintenance operation for many years.

Lithium Corporation of America's Minneapolis, Minnesota, plant produces pure lithium metal as well as various lithium salts. In the production of lithium chloride, SARAN Lined Pipe is used to carry LiCl brine to drying equipment for the removal of water. This brine is extremely corrosive and will quickly eat through steel pipe should a crack develop in the lining. Other SARAN Lined Pipe carries suspensions of lithium fluoride and hydrofluoric acid, a combination which will attack and destroy even glass. Because of its strength and extreme corrosion resistance, there's never been a failure in the SARAN Lined Pipe.

SARAN Lined Pipe at this plant is installed close to floor level in some working areas, constantly exposed to the danger of accidental damage from trucks and tools. Lithium's engineers stated, "SARAN Lined Pipe provides protection from outside damage and from corrosion by the solutions carried. In eight years of pumping LiCl brine through SARAN Lined Pipe at 30 to 50 psi, there's never been a breakdown, and very little maintenance was required."

SARAN Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200° F. They can be cut, fitted and modified easily in the field, without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale, Michigan, Dept. 2281AM5-23.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Washington Newsletter

CHEMICAL WEEK
May 23, 1959

A study of the highly automated chemical and petroleum industries is being urged as a vital part of a national study on the impact automation holds for the American economy.

The National Planning Assn. urges that automation is the "key to the survival of our way of life" in the crucial economic and political struggle with Russia.

An NPA report, prepared by John Diebold, states that automation has so far barely scratched the surface of U.S. business. Diebold thinks a study should be made—to run perhaps two years and cost about $500,000. He notes that Russia already has set up a separate ministry in Moscow to deal exclusively with the subject.

He also feels that automation's greatest progress in the next few years will be as a tool of management in planning—rather than in production programing and control devices, where it has made the greatest gains so far. This will be accomplished through the greater utilization of electronic computers and data processing machinery in charting over-all planning and production.

Diebold believes that this will create further great new changes in chemical and petroleum industries that have already automated their production.

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Controversy and confusion over the government stockpile won't die down. Another blow for disposal was struck last week by the House Appropriations Committee, which voted against giving General Services Administration the money to replace stocks of natural rubber that it has to rotate because of deterioration. GSA chief Franklin Floete testified that his agency is considering ways to sell off no less than half the current $8-billion worth of commodities on hand.

GSA pays for its replacement rubber out of funds borrowed from the Treasury. Some Congressmen say they simply want GSA to ask for direct appropriations so that Congress will have some control over stockpile disposal management. But the real point is that Congressional pressure to pare unneeded government holdings is now being brought to bear.

This pressure stems partly from consumers, processors and users of stockpiled commodities who want to ease present market pinches in such commodities as copper, rubber, nickel, aluminum.

The government is pledged by law not to unload commodities in the stockpile without Congressional approval, and then only in such a way as not to disrupt normal commercial markets.

But the trend is toward some new formula for disposal. Even mining-state legislators, who met with Floete and aluminum producers

last week to discuss new legislation to "lock up" all existing government supplies, admit any such new law would likely contain a spellout of the conditions under which the government may dispose of surpluses.

One loophole the present law contains involves the term "obsolescence." Since the government may sell off items it puts in this category, officials who favor disposal are trying to find a way to apply this term to rubber, copper, aluminum and other raw materials.

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Lower rates for chemical shippers will be at stake next week when the railroads go before the Interstate Commerce Commission to plug for new freedom to cut freight rates. The immediate case at hand involves lower rail rates for hauling paint and related articles.

The outcome of the case, now under suspension by ICC, will have long-range effects on all shippers. What the rails want is freedom to cut freight rates on a selective basis where they think they can tap larger volumes of freight. The rails argue that as long as rates produce a profit, ICC should allow the lower rates regardless of their competitive effect on other transportation. Truckers and waterway operators, however, are vigorously opposing the move. If the rails lose the ICC decision, they are sure to take the matter on to the courts.

•

Transfer of control over radiation hazards from the Atomic Energy Commission to the Public Health Service is strongly backed by independent scientists as well as Public Health officials. In Senate hearings on the proposal last week, university scientists pointed out that AEC, charged with promoting atomic energy, is poorly oriented to serve as the public watchdog against its own projects. They also noted that the greatest hazards today are not from fallout but from X-ray machines, ground radiation and other sources. Sen. Lister Hill (D., Ala.), sponsor of the bill directing the Surgeon General to come up with plans for giving "primary responsibility" to public health agencies, feels confident of passage before summer.

•

A clarification on use of stilbestrol and arsenic in animal and poultry feed is expected to be issued soon by the Food & Drug Administration. Last year, Rep. James J. Delaney (D., N. Y.) tacked the so-called Delaney amendment onto the new food additives law to prevent any tolerances from being set for carcinogenic materials, whether they leave any residue in the meat or not. Both FDA and the industry consider the amendment unworkable, find that through technicalities in the law it discriminates against newcomers in the feed business. They are struggling for a way to modify it without changing the intent.

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Los Angeles' smog problem is such that natural gas should have top priority as boiler fuel, a Federal Power Commission examiner ruled. He authorized El Paso Natural Gas Co. to sell up to 100 million cu. ft./-day of gas to Southern California Edison Co. for its Los Angeles plants.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

May 23 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1959

First Technical Book On Aerosols Published

For the first time, complete information on packaging products in pressurized containers has been set down in one place – a 411-page book by Herzka and Pickthall titled "Pressurized Packaging (Aerosols)," now being sold.

Chapters give detailed information on propellents, containers, valves, filling methods, laboratory procedures, emulsion systems and perfumes. Graphs, charts and photos illustrate all chapters, which are followed by lists of literature references and significant patents.

Formulations – over 200 in all – are included, on a wide range of products from insecticides and paints to cosmetics, perfumes and foods. Appendices cover common abbreviations, technical terms, trademarks and trade-names, and aerosol producers throughout the world. The book is considered an extremely valuable reference for both research and development and management groups.

New U.S.I. Sales Office Opens in San Francisco

U.S.I. has established a San Francisco sales office, managed by Kenneth Fietz, who has been a representative of the company's New York Sales Division for the past 16 years. The new office, located at 220 Montgomery Street, was created to serve U.S.I. customers in central and northern California, Oregon and Washington. This office is tied in with U.S.I.'s automated communications system through Pacific Coast headquarters in Los Angeles. This will facilitate the processing of orders and messages by the company's offices and plants in all parts of the country.

H^3-Labeled Methionine Gives Clue to Protein Synthesis in Cells

In a recent study of protein synthesis in the cells of adult mice, DL-methionine labeled with tritium (H^3) was injected into test animals and then traced by radioautography methods. Results revealed that the most active protein synthesis involving methionine takes place continuously and independently within the cytoplasm and nuclear chromatin. Very little protein is synthesized from methionine in the nucleolus.

In this particular study, tritium was used as the tracer element because its low β-ray energy allows good radioautographic resolution. Previous investigations with S^{35}-labeled methionine had shown only that this amino acid is continuously being incorporated into protein in all cells. However, the exact distribution of synthesis in the nucleus and cytoplasm could not be determined up to this time because the high β-ray energy of S^{35} prevented good resolution.

U.S.I. Starts Up 75-Million-Lb. Polyethylene Plant at Houston

Low and Medium Density Resins Being Produced by High Pressure Process. Plans Already Underway to Double Capacity.

U.S.I.'s new high pressure polyethylene plant has just been put into operation at Houston, Texas, to make 75 million pounds per year of PETROTHENE® resins.

The Houston installation was rushed into production some six to eight weeks ahead of schedule when demand for PETROTHENE resins began to outrun supply late in 1958.

As a result of this demand, a major expansion is already being planned, to double the new plant's capacity and bring the company's PETROTHENE output in Houston to 150 million pounds of high pressure polyethylene per year. At Tuscola, Illinois, U.S.I. now turns out about 100 million pounds of polyethylene annually. Thus, when the planned expansion at Houston is completed late in 1960, total U.S.I. capacity will be 250 million pounds of high pressure resins per year. This will make the company the second largest polyethylene producer in the country.

The new plant is well situated on the Houston Ship Channel for shipment of resins by all means of transportation. Export shipments are facilitated by the extensive port facilities available in Houston. The new installation is assured of a plentiful supply of ethylene – the major raw material – from salt dome storage facilities.

MORE

Oils Solubilized in Alcohol By New Patented Technique

Drug and cosmetic manufacturers can now formulate water-clear, non-aqueous products containing both oils and low-molecular-weight alcohols, via a new solubilizing technique described in U.S. Patent No. 2,865,859 issued recently.

According to the patent, it has never been possible commercially to prepare cosmetic or industrial solutions containing these alcohols plus large quantities of oil. Layering has always taken place. The technique described makes miscibility possible by including low-molecular-weight aliphatic alcohol esters of high-molecular-weight fatty acids.

Mixtures of esters such as ethyl laurate, butyl myristate, amyl oleate, propyl linoleate or isopropyl palmitate are cited. The resulting solutions would contain 20-50% oil, 20-50% low alcohol and 5-20% ester. The oils may be of any class – animal, vegetable or mineral – and the alcohols preferably in the one to five carbon group, such as ethanol, methanol and isopropyl alcohol.

Suggested formulations are given for cosmetic compositions which are claimed highly stable over a wide temperature range for long periods, without separation. Examples include sun-screening compounds, hand lotions, hair preparations, soaps, colognes, antiperspirants and after-shave lotions.

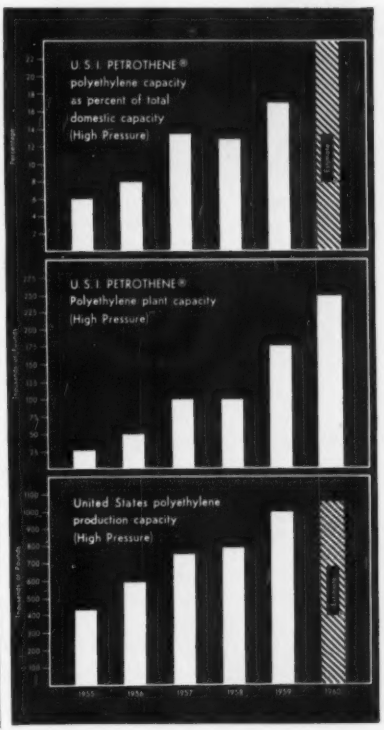
Other suggested fields of applications include metal working compounds, coatings, dry cleaning fluids, hydraulic fluids, biocides and lubricants.

NaK Basis of Prefab High-Temperature Test Loop

A high-temperature test loop, which uses NaK (sodium-potassium alloy) as the circulating medium, is now available as a package unit for research and study purposes.

The loop, designed for 1,000° F, can be employed to examine NaK's natural circulation characteristics, to study oxygen solubility in the alloy, to analyze flowmeter and pump performance, expansion treatment and piping arrangement, to investigate corrosion, mass transfer and metal stress, to design heat exchangers, and to develop pumps.

The unit consists of heaters and coolers, heat exchangers, EM pumps and flowmeters, cold trap, plugging indicators and instruments.



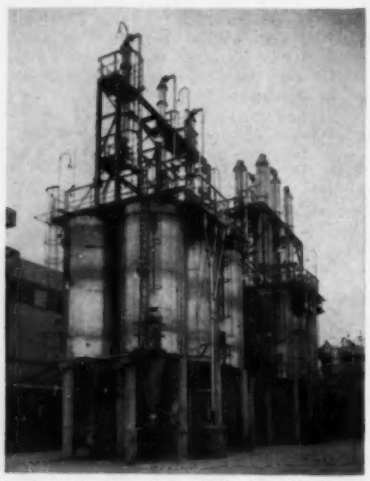
May 23 ★ **U.S.I. CHEMICAL NEWS** ★ 1959

CONTINUED *Polyethylene*

Other Resins Under Consideration

The company is now producing low density (.913 – .924) and medium density (.925 – .929) resins at the Houston unit. However, extensive research work has been done on the new high density polyethylenes and a process has been developed which is believed superior to any now used, both from a product quality and production cost standpoint. The process has not yet been commercialized due to the current market conditions on high density materials. U.S.I. is also studying polypropylenes and other polyolefins in pilot plant, and hopes to have more to say about them later in the year.

In less than four years U.S.I. has advanced from a nonproducer of polyethylene resins to its present position as third largest producer in the field. Commencing with an output of 26 million pounds in 1955, production increased to 50 million in 1956, 100 million in 1957, and now 175 million pounds. When the contemplated expansion at Houston is completed, the company will have realized a total increase in production capacity of some 900% since 1955.

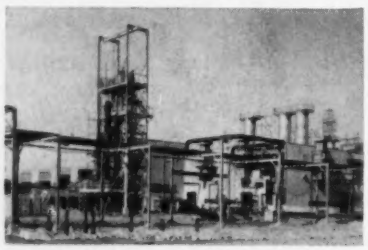


Product storage silos at U.S.I. polyethylene plant, Houston, Texas.

Film Grades a Specialty

Although U.S.I. makes a full line of resins for all applications, much of its growth in polyethylene has been based on special efforts to develop improved coating and film grade resins. Recently the company pioneered a technique for producing crystal-clear cast film. This material has excellent potential in the huge bread wrap field and other large-volume overwrap markets.

Tailor-making resins for specific purposes was originally and still is one of the distinguishing features of U.S.I. as a polyethylene producer. In all, the company markets some 70 resins today, each varying somewhat in melt index, density, strength, clarity, gloss, slip, stiffness and other properties.



Gas-producing area at Houston plant.

Two New Aerosol Formulas Contain Anhydrous Alcohol

Two new formulations – one for a white shoe polish, the other for a stocking-run stopper – have been developed by one chemical manufacturer for consideration by aerosol packagers.

The run-stopping spray consists of equal parts of anhydrous ethanol and a fast-drying adhesive, plus propellant, coloring and perfume. The formula is said to be nonflammable, and is considered stable, although stability tests have not been completed as yet. Recommended filling pressure and method of application are given.

The shoe polish spray – containing an ethanolic solution of PVP/VA, a sebacate, titanium dioxide, glycerine, isopropanol, acetone and propellant – is claimed to eliminate messy handling and to allow easy touch-up. Filling techniques, valve types and pressure are suggested.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Radioactive crystalline C^{14}-L-glutamine can now be obtained for in vivo studies of blood-brain barrier permeability and biological utilization of glutamine by brain and other organs. Specific activity of product is 27.8 #/mg. **No. 1470**

New carbon-monoxide-poisoning test kit now on market determines extent of CO poisoning in a minute by testing exhaled air or in under five minutes by testing blood sample. Color change in treated silica gel indicates % CO in blood. **No. 1471**

Reactor fuel technology is covered in new, 120-page volume now being sold. Includes papers and discussion on economic fuel selection, blanket fuel systems, types of uranium systems, types of fuel elements, cladding and canning. **No. 1472**

Phosphorus pentasulfide safe-handling practices are described in 14-page safety data booklet which can now be purchased. Discusses hazards, protective equipment, containers, waste disposal, first aid, medical care. **No. 1473**

A circular, slide-rule-type of device, which predicts whether a chemical reaction is possible for 10,000 different chemical equations, is now available to chemists and chemistry students. Complete use instructions given. **No. 1474**

Refined ethylene of 99.5% minimum active-ingredient content is described in new data sheet now being offered. Data includes specifications, properties, shipping information, uses plus references on use as ripening agent. **No. 1475**

New analyzer, said to determine amounts of over 20 amino acids in a protein hydrolysate in only 22 hours, is described in new brochure. Results claimed consistent within 2-3%. Typical run shown. Specifications given. **No. 1476**

Cold caustic pulping of mixed hardwoods is detailed in technical report now offered. Includes complete process description, equipment data, flow sheet, quality control tests. Discusses results of studies on pulping variables. **No. 1477**

Niobium and its compounds are described in new book now being sold. Chapters cover sources, supply, economics, extraction, separation, metal preparation, impurities, properties, plating, alloys, reactions, nuclear uses. **No. 1478**

Over 125 radioactive measuring instruments are listed in new 76-page catalog. Detecting, counting and recording instruments are described. Included are systems for research, medicine and education. **No. 1479**

What's Happening in Nitrogen-Propelled Aerosols

Six predictions of significant market developments

1 *Chocolate syrups* will challenge toothpastes for top spot.

2 *Light-duty detergent* will be introduced by major soaper.

3 *Nitrogen-packed coffee* will spark a hassle over patents.

4 *Baby food* will go into test market within a year.

5 *Vitamin aerosols* will be brought out by more companies

6 *Maple syrup* will soon make its debut in a nitrogen pack.

Nitrogen Aerosol Forecast

At next week's meeting of the Chemical Specialties Manufacturers Assn. in Chicago, '58's sales tally for aerosols will be disclosed. Sure to receive close attention will be the performance turned in by nitrogen-propelled products—one of the industry's most likely growth items—in their first full year on the market.

But the CSMA survey will tell only how nitrogen has fared in the past. To get an idea of what's ahead, *CW* talked to fillers, can and valve manufacturers and propellent suppliers. Here are some of the findings:

Toothpastes Sparkle: Nitrogen-packed toothpaste, now leader in the field—in '58, more than 30 million units were sold—will be major money-maker for years. Although this product got off to a somewhat shaky start because of some complaints about paste consistency, the product has now won public acceptance; and some fillers are predicting that in '59 aerosol toothpaste will grab 25% of total toothpaste sales.

Chocolate on Top? On a volume basis, toothpastes face an immediate challenge, according to Robert Abplanalp, president of Precision Valve (Yonkers, N.Y.). He figures chocolate syrups will overtake toothpastes this year as top-volume item. This market, pioneered by Sifer's Chocolate Syrup Co.'s (Iona, Kan.) Chocolate Flo'z, is bolstered by the entry of big companies such as Nestle's (with Zip), and sales in '58 should be in excess of 35 million units, according to most estimates; more than 50 million, according to one bullish prediction.

Cosmetics Climbing: In '58, a number of companies moved to nitrogen packaging for cosmetics and toiletries. Charles Antell (now a part of B. T. Babbitt) brought out a pressurized hair cream for men, and Wildroot (now a part of Colgate-Palmolive) also began packaging a portion of its product line in nitrogen-propelled packages.

Two big hand lotion makers, Chesebrough-Pond's and Jergens are now selling nitrogen-propelled units, and some seven other companies are said to have products on the way. Hair shampoos will also start making their appearance in this type of container.

Vitamins for Growth: One of the fastest-moving items in nitrogen packages is vitamin syrup. Pfizer's Roerig Division and Abbott Laboratories are pushing these items. Within another year, there will probably be at least 10 suppliers of this type of product. Sales now (*CW*'s estimate) are already moving at better than a million units/-year. Morris Root of G. Barr & Co. (Chicago) feels that nitrogen packaging will eventually capture 90% of the vitamin field.

Syrups Are Stirring: Look for a nitrogen-packed maple syrup soon from one of the big syrup suppliers. Also look for more fruit syrup concentrates to make their appearance. At least two are out now, with more said to be on the verge of introduction, all capitalizing on chocolate syrup's success.

More Coffees? Closely being watched by the major coffee makers is the progress of the first nitrogen-aerosol coffee, Tasti Cup. Mortimer Kahan, president of Tasti Cup Coffee Co., told *CW* he is optimistic about the future of aerosol coffee, despite the recent drop in coffee prices. He reports that sales are climbing faster than 10% each month.

Kahan plans to sell stock in his company soon to get the money to push his product via TV and other mass-advertising media. He already has a patent on a process for making the coffee extract that goes into his product, thinks he can get one for the use of nitrogen in coffee aerosols. But he will have trouble doing this. Other companies have told *CW* they would dispute any claims Kahan may make on the product.

Some fillers agree that coffee has a big future in aerosols, but not in the form now being turned out by Kahan. Tasti Cup must be kept refrigerated, and this is felt by some to be a drawback. Look for the introduction of a room-temperature-stable aerosol coffee from one of the major coffee companies—perhaps Nestle's or Maxwell House—within the next six months or year.

Baby Food: Aerosol baby food products will appear on the market within a year, observers say. Beech-Nut and Gerber Products Co. are said to be at work on this. The aerosol baby food in large containers will probably get the same "saves waste" sales pitch as that now given foods in small (one-quarter the amount in aerosol cans) glass containers.

Some fillers believe that aerosol baby foods would be completely unsuccessful. Said one: "The method of packaging isn't any more sanitary than packaging in glass jars, no matter what they say. The food is sure to clog in the spout, and bacteria will grow there. Once a young mother sees such a messy spout, she will drop the product."

Detergent's Debut: A detergent now being packed in a nitrogen aerosol is Formit's (Chicago) Fresh-n-Clean, designed for washing lingerie and other fine fabrics. And more detergents are

on the way. One of the big developments this year will be the debut of a liquid light-duty detergent by B. T. Babbitt Inc. It will put Glim in a pressure container. The product will probably be ready sometime this summer. All of the major soap companies have done some exploring of the aerosol detergent idea. If the first product catches on, look for others.

Other Products: Salad dressings, mayonnaise, jams and other items in the food field don't appear to have big immediate growth prospects. But some observers are more optimistic. Kraft has brought out a pressure-packed cheese dip and is said to be doing well with it. One filler predicts that nitrogen packaging will grab 25% of this market in the next few years.

Building Up a Boom: Developments that will help push sales of nitrogen aerosols higher are these:

• Containers: American Can Co. this year will bring out a 6-oz. aluminum aerosol can. This could give a boost to toothpastes, similar products. Using aluminum avoids the corrosion problem caused by sodium lauryl sulfate in some toothpastes, and this could help extend product shelf-life. The aluminum containers are also expected to get a good share of cosmetic packaging; cosmetics' generally high prices will support the additional cost of the aluminum can.

Another container development said to be on the way is a 22-oz. aerosol can. This unit looks especially good to potential marketers of aerosol detergents and industrial products.

• Valves: This year, Risdon and Precision Valve came out with new metered valves suitable for use on nitrogen aerosols. These metering devices prevent loss of propellent when a can is inverted and discharged inadvertently—a problem with non-metered products. Pharmaceutical makers now use the metered valves; and detergent makers will be next.

• Propellents: Soon to be available: Du Pont's Freon C-318 (octafluorocyclobutane) for food packages once final FDA approval is in. But it may not make much of a dent in nitrogen packaging, since Freon C-318 will be used mostly with nitrous oxide propellents for items such as whipping creams. This is an area in which nitrogen is not used.

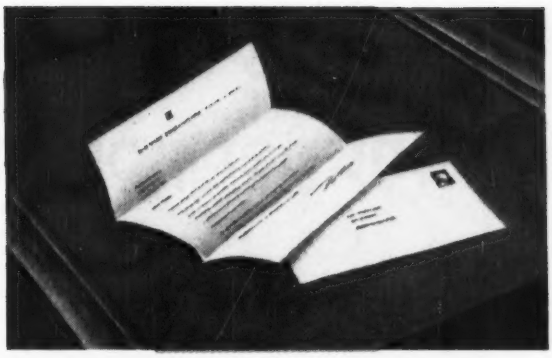
There's little likelihood that any other gas, such as carbon dioxide, will replace nitrogen. Over 30,000 6-oz. containers can be filled with $5 worth of nitrogen (that's the figure for aerosol coffee) and a more economical product would be hard to find.

Equipment: If nitrogen aerosols are to compete with other forms of food packaging it's imperative that fillers have machines that will give high-speed filling rates. Baby foods, for instance, are packed in glass containers at around 1,000 units/minute. This year, both Arthur Colton Co. (Detroit) and Majonnier Associates (Franklin Park, Ill.) came out with faster filling equipment for nitrogen packages. A Colton rotary line has 14 filling spouts, allows speeds up to 250 cans/minute; special attachments boost output to 300 cans/minute. Cost of entire unit: $40,000 - $50,000. These equipment costs are obviously high for a contract filler—but it isn't the contract filler that will buy the high-speed equipment. Most of it will go to big companies that package their own products.

Who Will Fill Them: Even should the expected upsurge take place in the field of nitrogen-propelled aerosols, it won't mean much additional business for independent, contract fillers. All the major toothpaste makers, with the exception of Bristol-Myers, package their own products. And in the food field, it's unlikely that custom fillers will get much of the volume.

This doesn't discourage aerosol makers. They feel that much of their future business may come, not from nitrogen packaging, but from filling spray items (nitrogen does not give finely divided sprays) with halocarbon-propane mixtures. These are less flammable than butane mixtures, are said to reduce packaging cost (of using pure fluoro propellent) 10-20%. And the fact that they contain flammable propane may discourage many formulators from doing their own packaging.

First product on the market using this new propane-based propellent will probably be a room deodorant. Lever is said to be ready to bring one out in a few weeks. It plainly shows that, though nitrogen is one major growth area for aerosols, it is far from the only one—and all developments are pointing to a continued boom in aerosols.



PROOF OF UNIFORMITY

of Emersol® Stearic Acids

One of our exacting carload customers of Emersol 132 recently advised us that they were discontinuing their meticulous lab-checking of all shipments of Emersol 132 Lily Stearic Acid.

This resulted from an examination of hundreds of past lab reports in which they found that the quality of Emery Stearic Acid simply doesn't vary—and that the considerable expense involved in over one hundred analyses every year could be safely eliminated. And when you consider that the reputation of a nationally known toiletry was at stake, we think this unqualified acceptance of Emersol Stearic Acid becomes the ultimate compliment to Emery quality.

Emersol 132 is the finest of the triple-pressed stearic acids. Its extremely low iodine value and unusually low content of impurities make it the purest commercial crystalline stearic acid available. For your sake—and ours—we intend to keep it that way. Check Emersol Stearic Acids in your product . . . write Dept. I-5 for sample or descriptive literature.

P.S. You will be glad to learn that the consistent quality of Emersol 132 costs no more than any other triple-pressed stearic acid.

Emery

Fatty Acid Sales Dept., Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio

Vopcolene Division, Los Angeles—Emery Industries (Canada), London, Ontario—Export Department, Cincinnati

SPECIALTIES

Pushbutton Starch

General Aerosols Inc. (Shelton, Conn.) has developed an aerosol laundry starch called Aeromagic Pushbutton Starch.

The product — pure starch, no plastic additives — can be sprayed directly on either wet or dry clothes just prior to ironing. With the new product, just one side of a material may be starched. This gives clothing the starched look on the outside, without the starch feel on the inside. The product is now being test-marketed in New England.

General Aerosols (the marketing branch of Dr. Winston H. Reed's consulting activities) is testing two other aerosol products under the Aeromagic name: Rid-O-Dust, a mop spray, and Ring-A-Way, a bowl and tub cleaner.

All three items are in 8-oz. cans, sell for 98¢.

Hotel Tryout

A new test-marketing service is available to Allied Members of the American Hotel Assn. that manufacture specialty products used in hotels.

Under AHA-sponsored plan, specialty products will be used for a specified period of time in 700 AHA-member hotels and motor-hotels throughout the country.

Service offered includes mailing samples of products, directions and questionnaires to selected hotels, tabulation of questionnaire returns and a report analyzing the returns and interpreting the findings. Price of the service: $2,000 for each product that is tested.

PRODUCTS

Seed Disinfectants: Chipman Chemical (Bound Brook, N. J.) has two new liquid seed disinfectants, Chipcote 75 (a nondiluted type) and Chipcote 25. Both contain methyl mercury nitrile. They're intended for application on small grains, flax, cotton and rice.

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Spinning Lubricant: Imperial Chemical Industries (P. O. Box 10, Montreal, Que.) has a new water-soluble anionic carding and spinning lubricant. It's said to be particularly suitable for use in processing of carpet

blends containing viscose rayon and regenerated protein stable fiber. The product has been named Cirrasol AR, and its use is intended to result in complete removal of oleine or oil from tightly twisted carpet yarns. Application, whether as a lubricant or soil-resisting agent, is at the rate of 1.5%.

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Three for Safety: Mine Safety Appliances Co. (Pittsburgh, Pa.) is offering three new skin protection creams (all contain hexachlorophene) under the name M-S-A Fend. Fend A-2 has a vanishing cream base, is for water insoluble irritants; Fend 1-2 has a nonvanishing cream base, is for water-soluble irritants; Fend S-2 is a silicone-reinforced vanishing cream for use against diverse soluble and insoluble irritants.

•

Win by Showing: Got a public relations problem related to pesticides and their use? The National Agricultural Chemicals Assn. (Washington, D. C.) may have an answer for you. It's making available, without charge, a special slide program, "Pesticides—Boon to Mankind." It consists of 58 color slides, along with a printed script, which can be presented in 25-30 minutes with a conventional 35-mm. projector. The presentation is designed specifically for layman groups—men or women.

•

Heat and Seal: An exothermic patching material that will generate its own heat to seal defects in the linings of heavy steel-melting furnaces has been developed by the Armour Research Foundation (Chicago). The material makes a permanent patch in less than an hour, is said to take only 20% of the time needed for currently used materials.

•

Quat: Onyn Oil & Chemical (190 Warren St., Jersey City, N.J.) has a new quaternary, BTC — 834-20% Powder. It's a 20% active n-alkyl dimethyl benzyl ammonium chloride on urea as a carrier.

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Polyethylene Toothpaste Tubes: American Can Co. has developed a polyethylene toothpaste tube. It's produced by an extrusion - injection molding method, has a coating said to guard against loss of flavor and essential oils by permeation. Canco's Bradley-Sun Division turns it out.

The lid's off on better paint products!

"Technological progress which now permits, for the first time, *'tailoring'* of epoxy plastic resins to specific needs promises to accelerate the growth of these previously limited plastic materials" — *The Journal of Commerce* (italics ours).

That statement was printed in December 1958. Thirty-one years earlier, in Detroit, Reichhold Chemicals, Inc., introduced *its first* unique synthetic resin. That resin was "tailored" for production of quick-drying automotive finishes, an important step forward in 1927.

Ever since that year, RCI has continually been a leader in providing important new developments and technical assistance to help America "lift the lid on better paint products."

As with other resins long favored by the surface coating manufacturer, RCI will "custom-make" epoxies to exacting requirements. RCI offers its EPOTUF epoxy resins as solids, liquids, or esters — and will also supply epoxy solids in any practical solution.

Reichhold makes hundreds of resins for surface coatings. Among other newer ones are isophthalic acid alkyds, melamine-formaldehydes, polyesters, and PVAc, acrylic and alkyd emulsions.

Wherever handsomer, tougher, more uniform and durable... in a word, wherever *better* paint products are being developed... superior resin technology is vital. If *you* have a problem involving surface coating resins, call on *RCI experience* for help in solving it.

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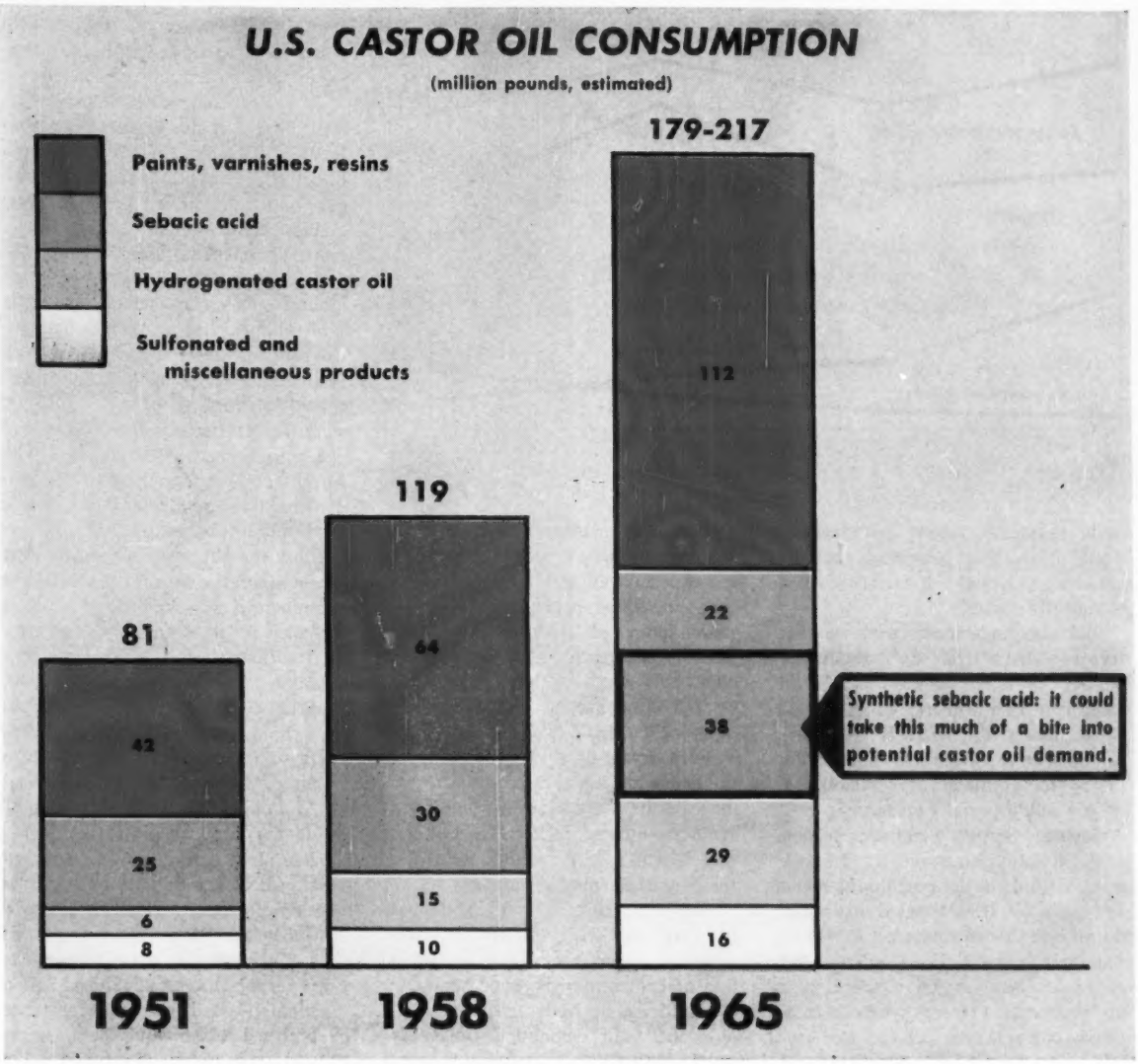


Castor Oil: Time for Domestic Dominance?

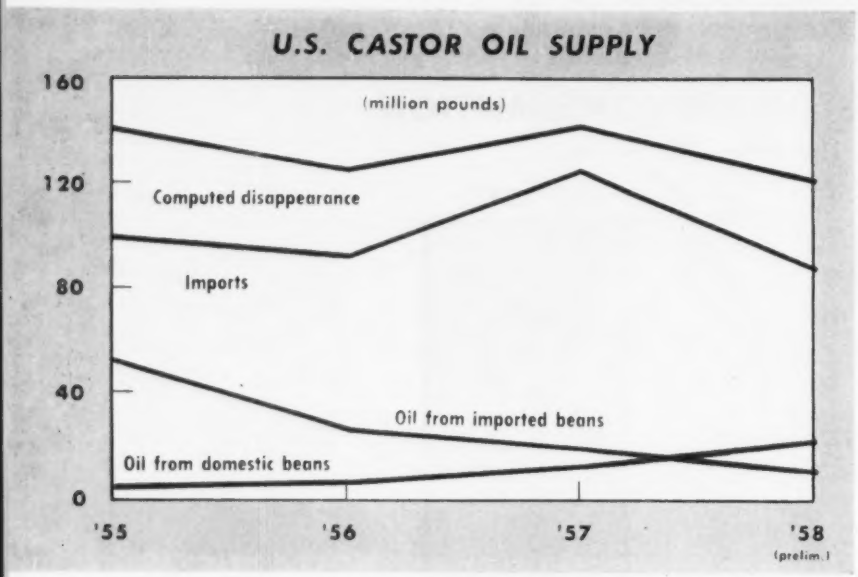
Economic and technologic changes now going on in world castor oil markets favor emergence of a strong castor oil-producing industry in the U.S. But there are reasons why this new business climate—favorable as it is—may not be quite good enough to rapidly change import-oriented U.S. castor oil supply patterns.

Some factors that could help boost U.S. castor oil production in the next few years are spelled out in a just-completed special report by economists of Stanford Research Institute.

For example, the report points out that foreign castor oil producers are inadvertently promoting a stronger U.S. industry by trying to restrict trade of castor beans and foster sale of extracted castor oil instead. If this trend continues, it might mean that U.S. buyers of foreign beans will look more to U.S. farmers for bean supplies so they can keep their equipment operating. There has, in fact, already been a noticeable trend toward use of home-grown beans in place of imported beans (*see graph p. 40*), but this stimulus is not to be overrated.

As important in bolstering U.S. production of castor beans and castor oil are these factors cited in the report: (1) the nonexistence of strong domestic competition, (2) the minimizing of technical difficulties in mechanical harvesting of castor beans, (3) the demand-boosting effect of more stable domestic supplies and pricing policies.

To these influences could be added the probable willingness of many farmers to switch from surplus-plagued food crops to industrial crops



such as castor beans. But farmers would have to be convinced that the conversion would be lucrative and technically feasible.

SRI also underscores some market factors that tend to discourage buildup of a strong U.S. castor oil industry. This forecast of castor oil consumption in the U.S. (an estimated increase from 119 million lbs. in '58 to, at most, 217 million lbs. in '65) isn't especially encouraging.

Sebacic Surge? Synthetic sebacic acid, SRI also points out, could knock a sizable hole in the potential demand for castor oil. It's estimated that about 60 million lbs. of castor oil would be required to produce 24 million lbs. of sebacic acid in '65 if there were no competition from synthetic material; but synthetic sebacic and iso-sebacic acids could, it's noted, account for 15 million lbs. of the potential sebacic acid market, thereby cut castor oil demand for this purpose down to 22 million lbs.

But synthetic sebacic is obviously having trouble breaking into the markets; just last week, U.S. Industrial-Chemicals—only U.S. maker of synthetic sebacic—revealed it's closing shop at Tuscola, Ill., until further market development indicates that plant reopening is feasible.

Sebacic acid now has four main uses: in manufacture of low-temperature vinyl plasticizers, ester-type synthetic lubricants, polyamides (nylon-6/10) and polyesters.

The previously bright outlook for sebacic acid in making of plasticizers has recently been clouded by gains of less-expensive adipic acid esters. Much the same thing has happened in the manufacture of synthetic lubricants, where sebacic acid esters—now most commonly used—are being crowded by esters of azelaic and pelargonic acids (*CW, April 4, p. 69*).

Both nylon-6/10 and rigid polyurethanes are highly touted and there may yet be considerable promise for synthetic sebacic in these areas—but there's controversy about how fast these markets may develop.

Assuming that a significant and growing market for sebacic acid would continue, there's still the question of competition between synthetic vs. castor oil-derived sebacic.

If the total demand is relatively small, synthetic sebacic would be at a disadvantage, because only continued large-scale production is economically feasible. But if demand is big enough to warrant making the synthetic acid, the price might conceivably gain an advantage over castor-derived material.

Still Questions: In the jet engine lube market, there are still a host of questions about ultimate engine sizes, the number of jets that will go into service, methods of lubrication. For this reason, says SRI, industry experts cautiously predict that by '65 the market for sebacic acid in lubricants may be two or three times the current 6 million lbs./year.

The backbone of the castor oil industry in the U.S. will continue to lie in manufacture of paint, varnishes, resins. SRI reports that castor oil consumption in these applications will climb to 112 million lbs. in '65, compared with 64 million used in '58.

A healthy increase of castor oil consumption is also expected in manufacture of hydrogenated castor oil. Forecast: 29 million lbs. in '65, compared with 15 million in '58. Grease makers are expected to rely heavily on hydrogenated castor oil in producing 12-hydroxy stearic acid for lithium greases; nonetheless, stearic acid—derived from other sources—will probably become competitive with 12-hydroxy stearic in this application.

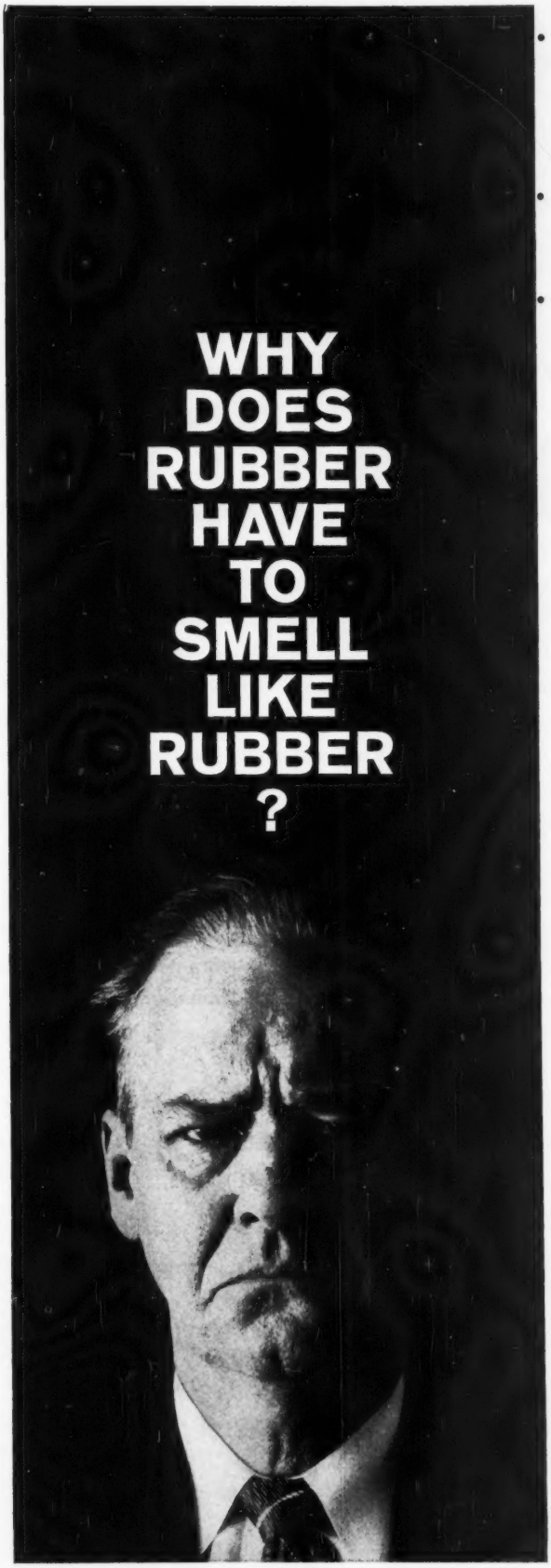
A substantial use of castor oil is in manufacture of sulfonated castor oil and miscellaneous derivatives. The current consumption rate of 10 million lbs. ('58) is expected to increase to 16 million lbs. in '65.

Other market areas with promising potentials for castor oil include the manufacture of a newly developed corrosion-resistant castor oil-urethane for industrial coatings. This material contains 80% castor oil by weight, could give considerable stimulus to the castor oil market even if only 10% of the industrial paint market were captured. Demand for an additional 20-25 million lbs./year of castor oil would result, according to SRI.

SRI also considers the foreign-developed polyamide fiber Rilsan as another potentially significant factor.

Codeveloper Snia Viscosa (Italy) tells *CW* that there are no definite plans yet for U.S. production of Rilsan —although good market acceptance of imported Rilsan would help further this long-range possibility.

Outlook: These factors affecting the future of castor oil are interpreted two ways. The pouring of foreign castor oil into the U.S. in large volume could be used as an argument that U.S. consumers are too dependent on imports, should encourage domestic production. On the other hand, the sheer magnitude of the foreign competition doubtless helps curb enthusiasm of potential U.S. producers who may be reluctant to tangle in such a competitive scene. The result is that forecasts of what's ahead in U.S. castor oil markets are still hard to make, but one major supply-demand switch might well settle the question almost overnight.



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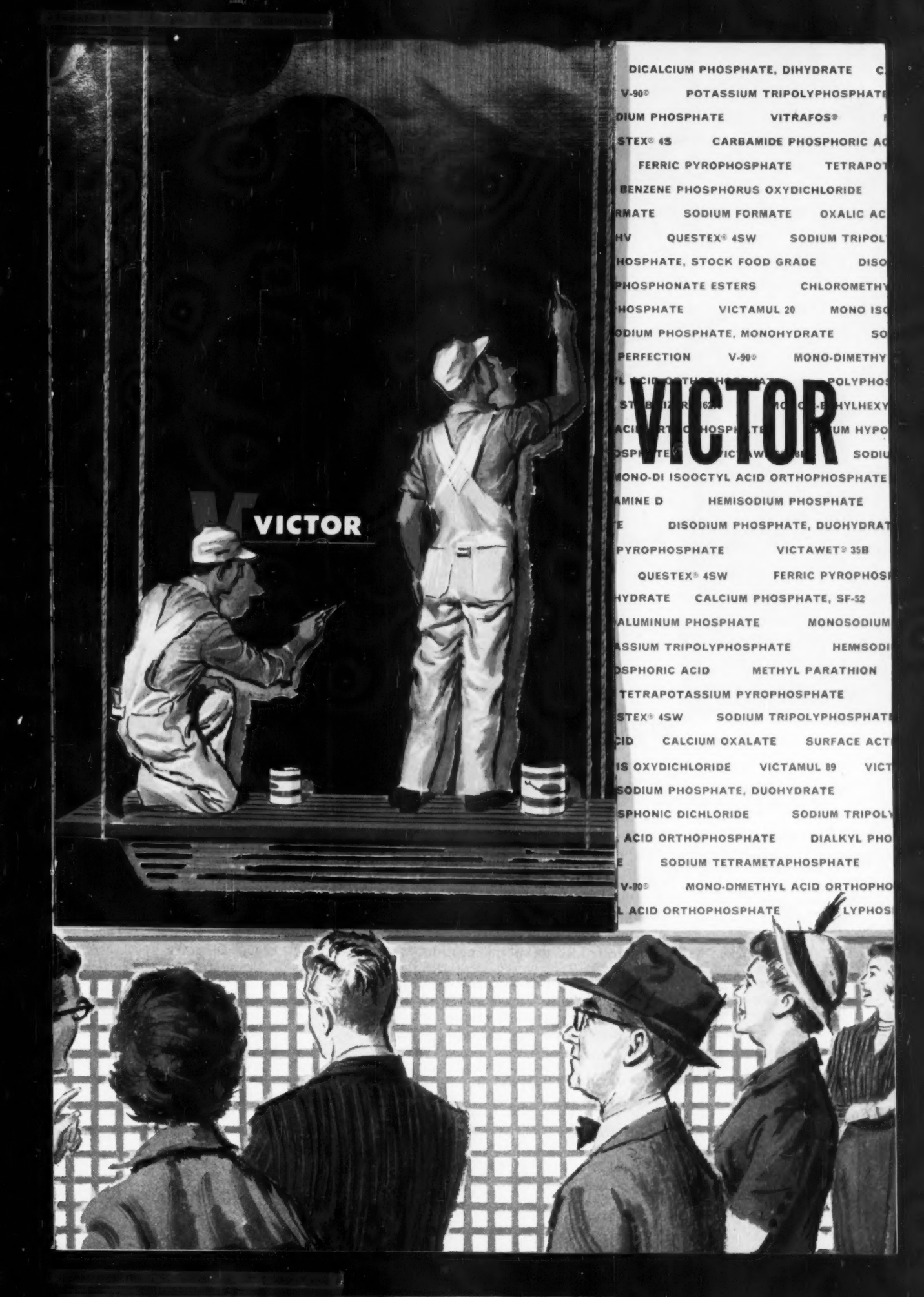
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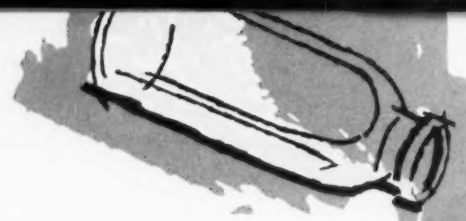

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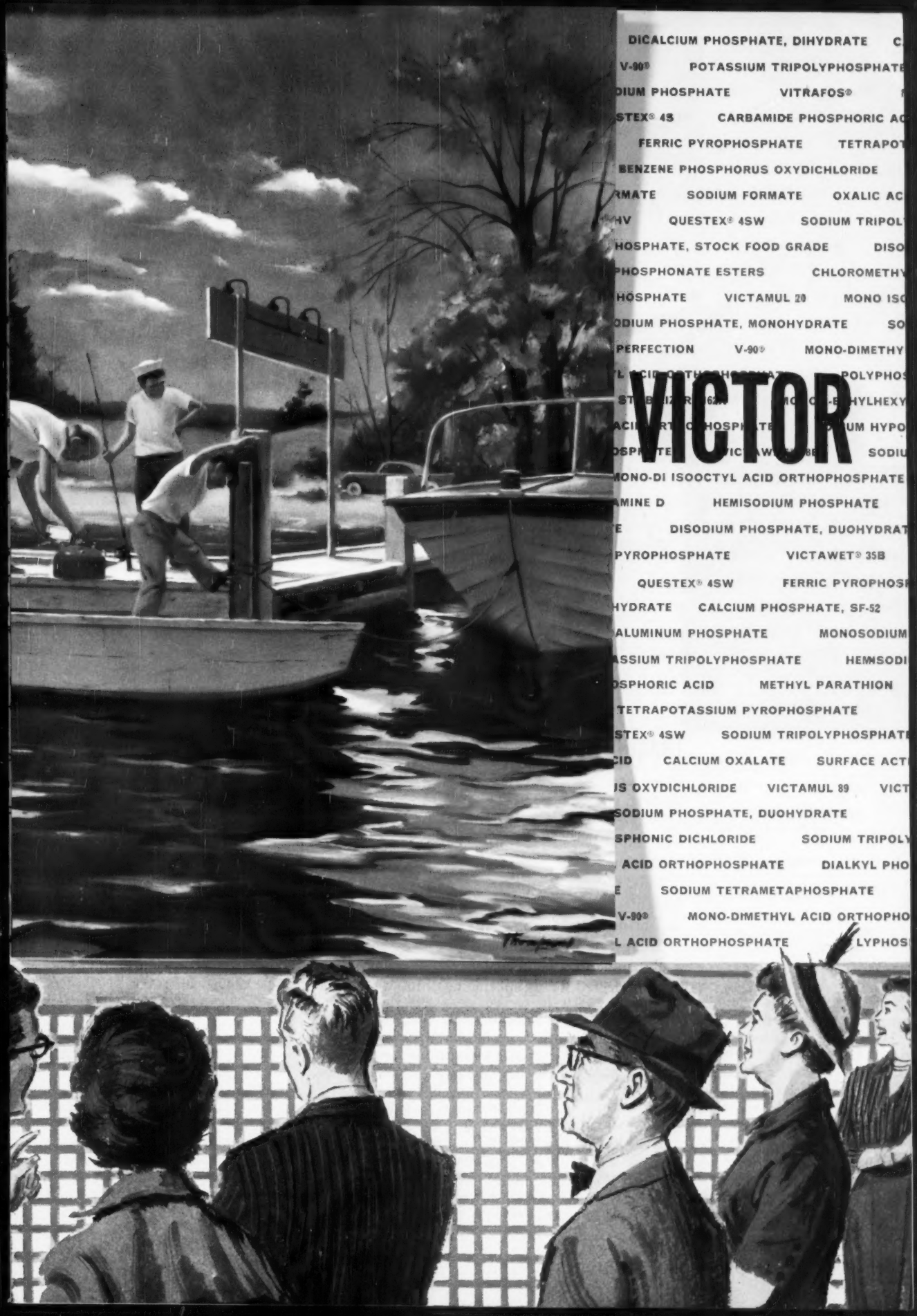
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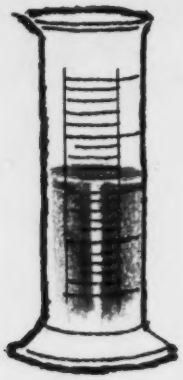

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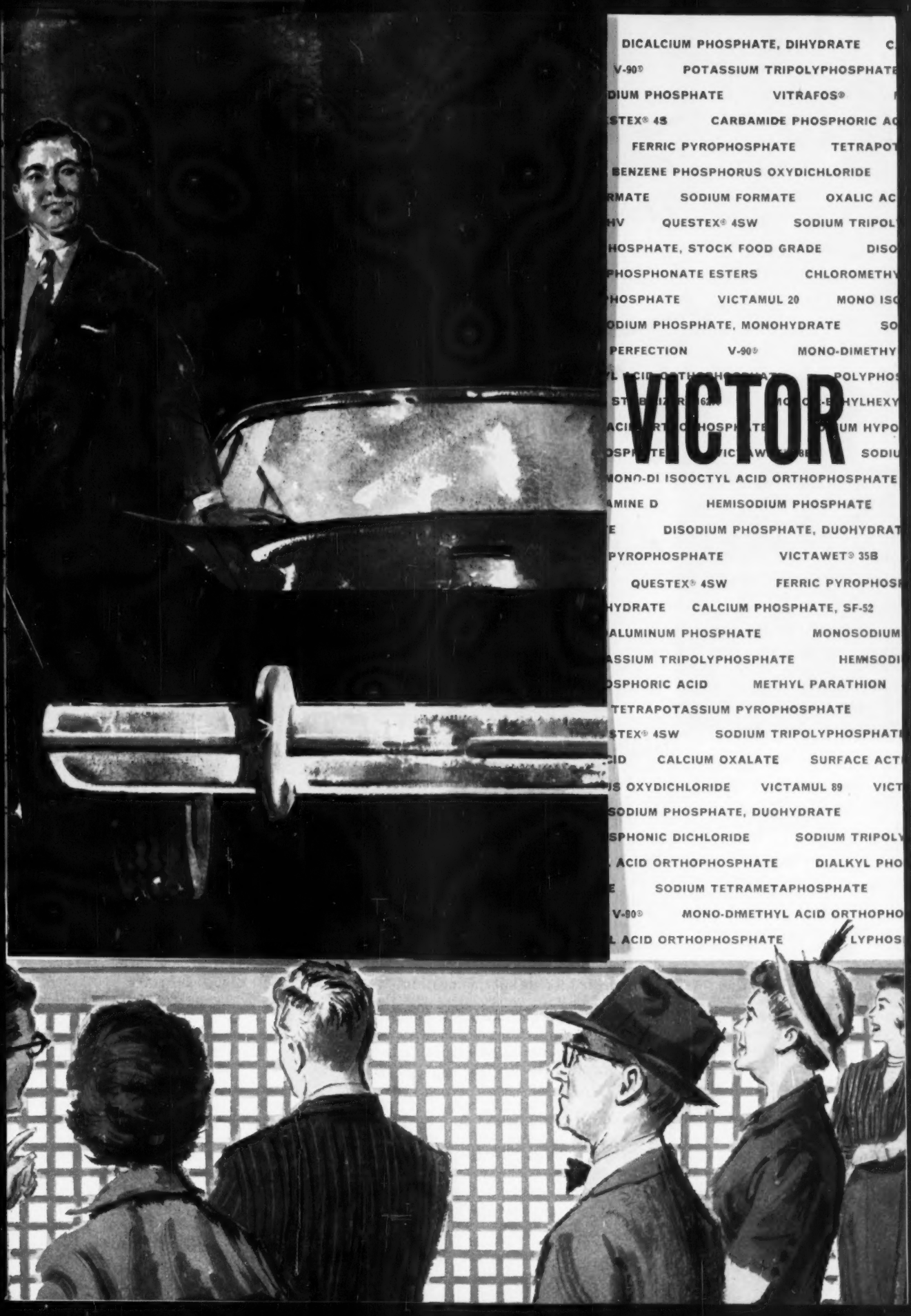
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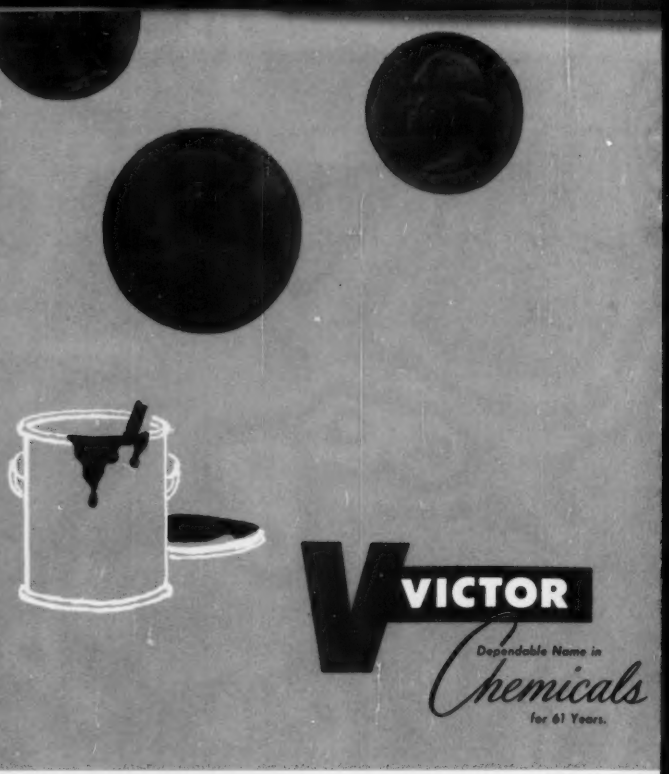

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it pays to see VICTOR

This concept of man's attempt to harness bird power in an attempt to fly first appeared in "The Man in the Moon"—published in Paris in 1648. In 1659, the same mode of air travel was depicted in another book, "The Flying Wanderer" Here, Brussel-Smith, noted graphic artist, has interpreted the original drawing through the medium of wood engraving.

IMAGINATION IN SPACE

Since Creation, man has looked out on space. At first, unknowing and incurious; then with the beginnings of understanding; now free and able to explore. Yet to move in space calls for wholly new concepts of energy.

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XP59-2

New styrene molding formulations minimize electrostatic fields that draw dust, cause flaws.

Plastics Seek Static-Free Market Reception

Plastics fabricators this week are getting their first chance at new products designed to eliminate an old problem—static electricity. With surface treatments and special additives, chemical company researcher teams have made some long strides toward eliminating the manufacturing flaws and surface defects that static-drawn dust causes.

Virtually all the big companies are in this research race—Dow, Union Carbide, Monsanto, American Cyanamid, among many. And although they have long had the problem, even with thermosetting resins, it has reached serious proportions only with the upsurge of thermoplastics. Polystyrene (which big custom-molder Chicago Molded Products terms the "worst offender"), polymethylmethacrylate, polyethylene and brand-new polypropylene are all causing problems for resin molders and plastic users.

Here are some of the new ideas that are giving them some help:

Surface Tack: Surface treatment is the secret of Dow's new polystyrene film, Trycite, which doesn't collect dust. Trycite was developed in answer to complaints from retailers and grocers who objected to loss of luster and transparency caused by dust on untreated film.

Dow, noting that surface dust causes some physical change in the film, has come up with four patents on surface treatments for destaticizing polymers (U.S. 2,832,696, -697, -698, -699). One method covers surface sulfonation of polyethylene articles using oleum, followed by application of a functionally basic nitrogen atom-containing antistatic agent. The latter includes such compounds as oxazolines (source: Commercial Solvents), fatty alkylolamine condensate (Geigy), and a substituted amide of alkyl phosphate (Victor Chemical).

Surface treatment is also the destaticizing route followed by Bohme Fettchemie (Dusseldorf, Germany) in its recently published Australian patent application 40,830. The firm claims that a hardened, water-soluble or water-dispersible condensation product of an amino triazine (or its derivatives, a keto compound and a polyalkylene oxide will prevent static on polyamides, polyesters, polyvinyls, cellulose acetate and also on natural or synthetic proteins.

Inside and Out: American Cyana-

mid is finding a good reception for its two latest antistatic agents. These are Catanac SN, chemically stearamidopropyldimethyl-β-hydroxyethylammonium nitrate, and Catanac SP, stearamidopropyldimethyl -β- hydroxyethylammonium dihydrogen phosphate. Both may be applied to resins and plastics either by incorporation into the molding composition or by surface application. For example, polystyrene pellets may be soaked in a 10% solution of the antistatic agent, dried, then molded by conventional methods. A less durable but equally effective treatment consists of wiping, dipping or spraying on solutions of the new agents.

Additive Approach. Monsanto has solved the static problem on polystyrene by coming up with two specially formulated, low-static styrenes. These are called Lustrex Lo-Stat 22 and Lo-Stat 29 (which offers improved heat resistance). The firm says these can be injection-molded into products having "virtually no attraction for dust particles." Clock housings and grilles for fans and air conditioners are typical applications.

A recent Union Carbide patent (U.S. 2,874,023) covers use of hydroxyethylated polyvinyl alcohol as an additive to eliminate static in hydrophobic resin compositions—e.g., polymers of acrylonitrile, vinyl chloride, vinylidene chloride, styrene, acrylonitrile copolymers with vinyl acetate, vinyl chloride, etc., and vinyl acetate-vinyl chloride. At least 5% of the additive is required on the total weight of polymer and additive.

Right Price: Cost remains a hurdle in destaticizer research because of the frequently critical pricing requirements on plastic items. But plastic goods manufacturers seem increasingly willing to pay the necessary premium. Monsanto, for example, charges 1¢/lb. extra for its new styrenes over regular grades and reports demand is good. Cyanamid's Catanac SN (65% active) costs $1.10/lb. and Catanac SP (35% active) $0.70/lb. in l.c.l. drum quantities. Price of the SP is expected to drop as production is scaled up. Both compounds are meeting with ready customer acceptance, Cyanamid reports.

The variety of these approaches to static elimination indicates the extent of the problem—and hints that still more work would be welcomed by plastics rabricators. And in this, chemical companies will be getting competition from equipment makers, who seek to design static eliminators for their machines. But the plastics user, as well as molder, gains from chemical approaches to static elimination—and that can give CPI firms extra research stimulus.

Mass Communication

Last week, Standard Oil of Indiana held its annual closed-door intercompany joint technical meeting for 350 supervisory researchers from labs in the U.S., Europe and Canada. The week-long, dawn-to-dark session covered subjects ranging from lab chemistry to the economics of unemployment.

Standard's meeting is the latest of a number of similar gatherings being held across the country by CPI firms such as National Lead and Dow Chemical. Aim of all: to improve intercompany technical communications, keep key research and development personnel up to date on goals, policies, progress and activities, not only of the companies but also of industry in general.

A spokesman for Standard told *CW:* "Our kind of research and development is never an ivory tower affair. The over-all picture—engineering, manufacturing, drilling, transportation, economics—directly influences a researcher's work. These meetings are designed to translate this influence into terms of his day-to-day work."

Meeting Mechanics: Standard's meeting was patterned after traditional technical society sessions: topics were presented both as formal papers and in panel and round-table discussions. Sessions were organized by major interest areas (some ran simultaneously)—from 8:30 a.m. to 9 p.m., with several breaks. According to Philip White, general manager of the parent company's research and development department, the meeting was designed to permit free exchange of information, much of it confidential.

Each major Standard affiliate (e.g., Pan American Petroleum, Amoco Chemical, Utah Oil Refining, Toluma Gas Products, American Oil) had a hand in framing the program, sent to the meeting only those researchers

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RESEARCH

who would get the most out of it.

Variety Key: More than 100 topics came under close scrutiny, emphasizing Standard's feeling that research supervisors' broad corporate knowledge is essential. Among the topics discussed: the problems of unemployment and the effect of business recovery upon it; how the small, economy cars planned by auto makers and the peaking out of compression ratios on larger cars will signal the end to the costly gasoline octane race; the coming ascendance of solid rocket fuels over liquid rocket fuels; remote control petroleum piping operations; and correlating personal history with the performance of a researcher.

Other Firms Meet, Too: National Lead Co.'s upcoming symposium on analytical and physical testing methods (June 4-5, at Niagara Falls, N.Y.) is designed to spread information on that subject to researchers from the firm's various laboratories. Each year, the meeting is held at a different National Lead laboratory to allow greater participation, give participants a chance to visit other laboratories.

Earlier this spring, Dow Chemical Co.'s Texas Division held its first technical meeting for employees—opened doors to all Dow and Ethyl-Dow employees. Reason for the meeting: to create a common ground for the exchange of ideas, an opportunity to develop a broader outlook of Texas Division activities.

At a recent Industrial Research Institute meeting, a group of research chemists from Hercules Powder Co. were invited to present their views on supervision. Chemist D. Robert Levering noted: "The quicker a new researcher becomes acquainted with the type of work each department does, and the sooner older men are informed of new trends of thinking or changes in the economic picture, the more likely will new ideas fit into the company picture. This is the supervisor's job."

Results of a recent survey by Case Institute of Technology (Cleveland) show that during a typical week chemists spend 16.5 hours in scientific communication; 6.7 hours in business communication.

It's likely that these figures will increase, as the trend to company-wide technical meetings expands through the CPI.

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Selling a Sales-Development Split

Foote Mineral Co. (Philadelphia) is now replacing the sales system that more than tripled its sales in five years. That system, in which salesmen filled in as commercial development men, hiked sales to the $25-million/year level. But it has outgrown its efficiency, so sales and chemical development sections are now to be separate groups.

Foote's director of marketing, James Fentress, says the company must now capitalize on past development work, improve sales-development coordination and provide for growth.

Back in '53, when the company's $8-million annual sales volume was handled by four men, Foote's future clearly lay in developing new products and markets. In fact, its products were so little known virtually any customer contact was much more a commercial development function than straight sales. "We called on the purchasing agent last," says Fentress.

But as the older system successfully brought sales to $25 million, the end of its usefulness became apparent. In a few years, for example, Foote added 19 new products to its line, with their technology well established. The total number of sales accounts passed the 500 mark.

Divided Effort: Salesmen, however, were spending 50% of their time selling, 50% on commercial development. Moreover, the force was averaging less than two calls/day (industry norm: five or more).

Just as serious, explains Fentress, was the problem of coordination. Each man acted independently in new-product development, although nominally under supervision of the market development director. Case in point: lithium chemicals in agriculture. A sales staffer set up a research program with a state university to determine lithium's potential as an agricultural trace element. The market development department first learned of the project through the salesman's normal call reports, quickly pointed out that the idea —even if it worked—was far from commercial payoff.

The answer to the problems, Fentress told *CW*, was a new organization that would relieve staffers of the development function, free them to "fulfill sales forecasts." Moreover, the new setup would have to be capable of handling sales increases that could double Foote's volume within five years.

Sales Switch: Foote's new sales department reorganization chart shows six general managers reporting to Fentress: sales, advertising, public relations, sales research and control, technical services, commercial development. The general sales manager directs all sales functions pertaining to the firm's standard products, leads the five sales managers who report to him

CW PHOTO—ED GILCREST

Foote's Fentress tells how new plan splits sales and development, speeds commercialization of past research.

(chemical, ceramic, metallurgical, sales coordination, export). Also, the general sales manager recommends price policy, executes and negotiates major sales contracts, directs physical distribution, directs preparation of quarterly sales forecasts, authorizes sales service expenditures and administers sales agency agreements.

Four-Way Development: On the commercial development side, four development personnel (special, chemical, ceramic and metallurgical product managers) report to the general manager of commercial development (who reports to Fentress). Charged with all commercial development functions, the general manager directs trial sales, market surveys physical distribution and individual and total sales forecasts for products under development. And he okays spending for development of technical service work.

In Foote's setup, the sales research and control general manager occupies a special niche. Although a big part of his job is to collect and analyze sales, cost and profit statistics, he is also responsible for coordinating the efforts of the marketing department with that of the research and development staff. He, with the general manager of commercial development, serves on the product development advisory committee in the R&D department.

The sales research department guides commercial development through preparation of market research data on development products. It analyzes market potential, geographic placement of markets, distribution channels, competitive problems, and the like. Normally, sales research gets into the development picture only after the R&D department has asked for an appraisal. If sales research shows the project worthwhile, the commercial development gives it "project" status.

Looking Ahead: Fentress believes that separation of sales from development will better bring the firm's resources to bear on future sales targets. Salesmen are now able to make more calls. Just as important, they have specific products to sell for specific uses.

Foote plans to adopt a geographical organization with district offices responsible for all products in specific territories. Right now, the company is educating sales staffers to sell across department product lines. Product managers are a possibility.

Fentress believes that Foote's sales might expand by as much as 33% each year in the immediate future. If so, the credit would lie with the company's flexibility—its willingness to reorganize to meet growing, changing markets.

Answers on the Line

Next week, Armstrong Cork Co. (Lancaster, Pa.) will unveil its dial-the-answer system for handling technical inquiries at trade shows.

On-the-spot answers to technical questions will be provided by a direct telephone line from Armstrong's booth at the Design Engineering Show in Philadelphia to the company's Research and Development Center in Lancaster.

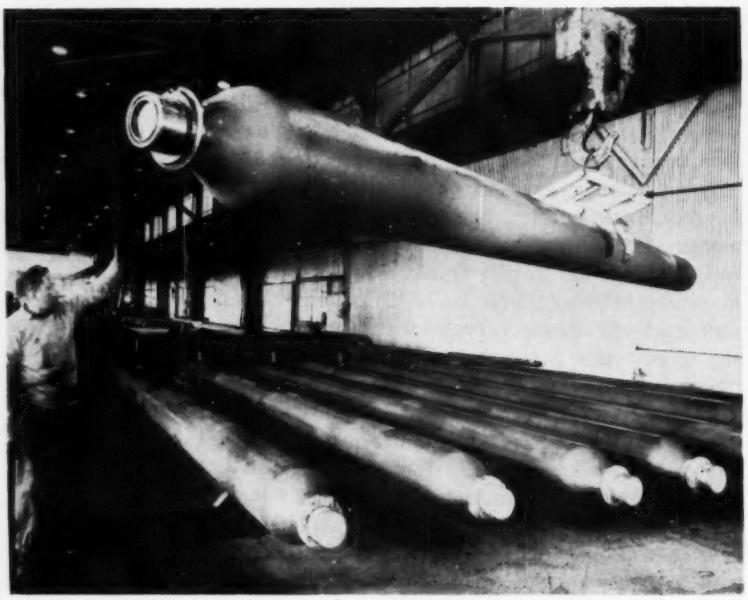
Detailed technical questions about any of the company's products (adhesives, friction materials, felts, etc.) will be referred immediately to the R&D man at the center best qualified to answer them.

Armstrong believes this move will promote its product story more thoroughly than answering tougher questions later by mail.

How It Works: A plastic phone booth, housing two phones, will enable callers to speak individually, or in conference, with any number of Armstrong R&D people. Added feature in the booth: a panel of photographs of R&D men. The picture of the R&D man on the line will light up so the caller can see him.

Cost of the setup will be small, largely that of actual installation of phones in the booth, since Armstrong will use lines it normally leases between Philadelphia and Lancaster. Calls to R&D personnel will be limited to regular working hours.

Armstrong will learn next week how much the direct line speeds answers to showgoers' technical questions. If the idea pans out as the company expects, direct lines may be a common sight at future exhibits.



Carrying Helium to New Markets

These steel gas-cylinder tubes point to booming helium markets (*CW, April 25, p. 86*). U.S. Bureau of Mines, now expanding helium output 200-290 cu. ft./year, has ordered 600 of the cylinders from U.S. Steel's National Tube Division for installation on 20 special freight cars. National hasn't produced the tubes recently, but now, with U.S. helium capacity nearing 900 million cu. ft./year, helium tube prospects are looking up.

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Technology
Newsletter

CHEMICAL WEEK
May 23, 1959

Potential chemical benefits from the peaceful atom were described by Dow's John Grebe and E. V. Luoma at last week's Plowshare symposium in San Francisco. Among the suggestions:

A nuclear blast could be set off in a limestone cave to yield low-cost calcium oxide and carbon dioxide. Dumping coal or coke into the cave, then blasting, might form calcium carbide, which is used to make acetylene—source of numerous organics. Among a spate of other reaction possibilities: detonation of a shot in a formation containing large quantities of sulfides to which refinery wastes have been added. This would provide large amounts of hydrogen sulfide as well as cracked hydrocarbons. The hydrogen sulfide could be burned to sulfur dioxide and made into sulfuric acid. Big problem: sealing the formation and preventing fractures.

•

Ceramic coatings for space ships are being evaluated by National Bureau of Standards, reportedly "show considerable promise." At an Air Force-Lockheed-sponsored symposium in Palo Alto, Calif., last week, NBS cited these advantages: ceramics' stability to ionizing radiation and volatilizing effect of high vacuum; resistance to micrometeorite damage. NBS is studying three techniques: Linde's detonation process, which sprays powdered material at high velocity through flame; a flame-spray process by Armour Research; and Giannini Labs' (Santa Ana, Calif.) plasmatron gun, which vaporizes ceramics in a plasma arc, deposits them on a metal surface.

•

Courtaulds Ltd. has started producing polypropylene yarns in developmental quantities at the Little Heath, Coventry, plant of British Celanese Ltd. Courtaulds is test-marketing the yarn, chiefly in industrial uses, says it has developed methods of spinning polypropylene into a "high-tenacity yarn comparable to other synthetic fibers in strength and abrasion resistance." Shell is supplying the polypropylene, but is importing it from Holland pending completion of its U.K. plant in '61. Imperial Chemical Industries also plans a U.K. polypropylene plant. Both Shell and ICI are recent licensees of the Montecatini processes for making isotactic polypropylene.

•

A new way to insulate copper, aluminum and other metal wires for high-temperature use has been turned up by Bell Telephone Laboratories researchers Steward Flaschen and Paul Garn. The insulation: fluoride formed on the wire surface by exposing it to oxidizing carriers of fluorine —fluorine or hydrogen fluoride—at 300-600 C. Wire and insulation retain flexibility, high insulation value, and freedom from porosity almost up to the melting point of the conductor.

•

Multi-Effect flash distillation—with an option of using nuclear heat—will be the process used in the second plant of the Interior Dept.'s demonstration-plant program for saline-water conversion. The plant will

have a capacity of about 1 million gal./day, will cost $1.5-2 million. Reason for the high capital cost: various experimental features will be included to test different valves, instrumentation and scale prevention methods; and provision will be made for possible future hookup to a nuclear reactor. The Atomic Energy Commission has been asked to provide a low-temperature reactor, but the plant will run for at least a year on conventional heat while problems of utilizing nuclear heat are being worked out. The Fluor Corp. has been conducting a feasibility study for Interior and the state of California on linking nuclear heat and flash distillation (*CW, April 25, p. 55*).

Site of the first demonstration plant — to use the long-tube vertical process — will likely be announced soon. Best bets: southern California or Texas.

•

Licenses to a cost- and timesaving shortcut in rubber drying were made available this week by The Patent and Licensing Corp., a wholly owned subsidiary of The Flinkote Co. (New York). The technique, patented (U.S. 2,854,426) by Paul Dasher of Dasher Rubber & Chemical Co. (Fairport Harbor, O.), employs a beefed-up Banbury mixer to heat rubber to dry temperature by mechanical action.

P&L estimates the Dasher process will save $5-10/ton over hot-air drying of conventional synthetic rubbers, even more on heat-sensitive types (e.g., acrylonitrile rubber) that now require vacuum drying. And the shorter drying cycle in the Banbury—one to three minutes —minimizes equipment requirements. A modified Banbury costs about the same as one dryer but handles about three times as much, and also permits simultaneous blending of carbon black and other additives. Royalty charges will likely be about $1/ton of rubber.

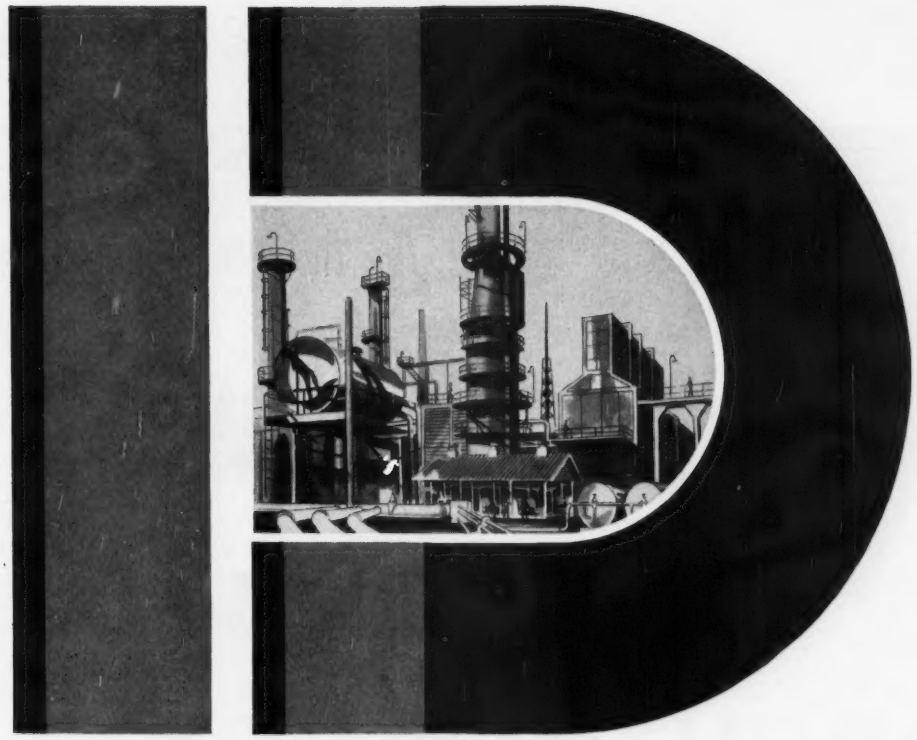
•

Plutonium fuel research took a big step forward last week with the opening of a $4-million fuel fabrication facility at Argonne National Laboratory. Frank Foote, director of ANL's metallurgy division, emphasized the importance of learning how to use man-made plutonium instead of remaining dependent on scattered supplies of natural uranium.

Plutonium is also the best for fast reactors (those that use no moderator to slow down neutrons) that can breed more fuel than they consume, Foote pointed out. They do this by capturing neutrons that escape from the reactor core in a surrounding blanket of fertile, but non-fissionable, uranuim-238, which is converted into more of the fissionable plutonium.

•

Silicone-rubber tape insulation for form-wound ac. motors is now offered by General Electric. Gain: open motors usable in many applications that have been limited to enclosed motors. GE uses an undisclosed wetting agent during impregnation to produce a glass- and Dacron-supported tape with the unusual combination of both mechanical and dielectric strength, eliminate silicone rubber's big weakness—a tendency to break easily.



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Daystrom has been granted license to manufacture and market control systems developed by Universal Oil Products and Daystrom Systems. Processes and techniques considered confidential by Daystrom clients will be handled by Daystrom Systems independently.

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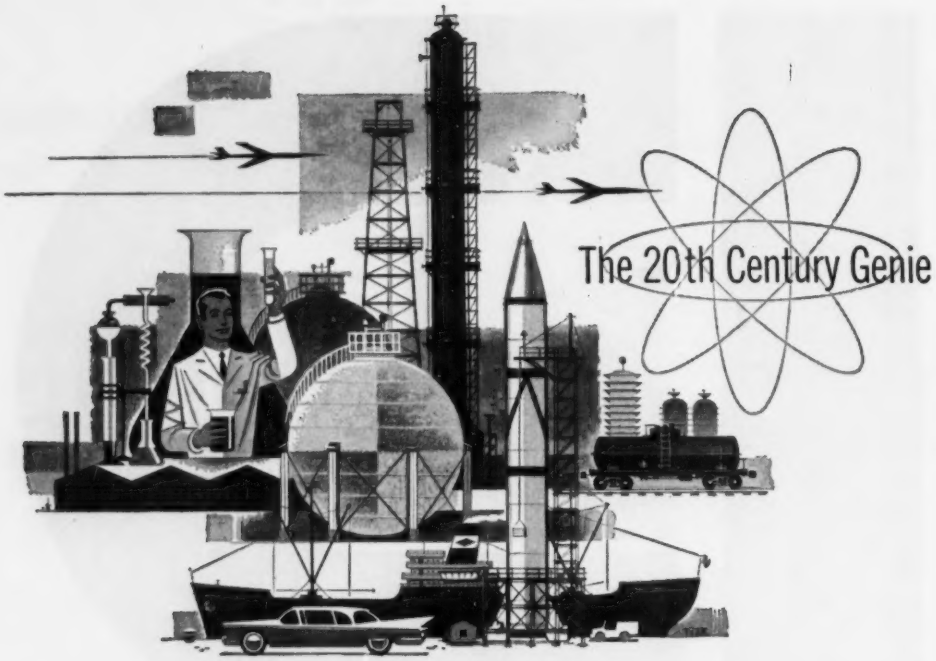

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Barron and Bechtler decided on careers in CPI. Behind their choice: summer work at chemical plants.

Two Tell Why They Chose Chemical Work

This year's college graduates are among the first to reflect the chemical industry's intensive efforts to sell itself in academic circles. How successful has industry been? CW's talks last week with two of Clemson College's June graduates provides an encouraging answer: the best way to interest students is to let them try CPI work.

Clemson, in the growing chemical area around South Carolina, has 17 chemical engineers in its class of '59. *CW* singled out:

• Charles Barron, a native of South Carolina, who is at the top, scholastically, of his chemical engineering senior class. He's listed in "Who's Who in American Colleges and Universities," is finishing his senior year on a $500 Westinghouse scholarship.

• Al Bechtler, 10th in the chemical engineering class, scholastically, who is president of the Clemson chapter of the American Institute of Chemical Engineers, and also in the "Who's Who."

Both have had a good taste of the chemical industry—outside the classroom. Barron worked one summer at Union Carbide's Charleston, W. Va., plant as a production department engineering trainee; spent another summer at Du Pont's Victoria, Tex., plant as a trainee in the polychemicals department; and a third summer at Deering-Milliken Research Corp. (Pendleton, S. C.) as a laboratory technician.

Bechtler spent last summer at Union Carbide Nuclear Co. (Oak Ridge, Tenn.) as a student engineer in the process engineering department.

Impetus: The CPI's job of "selling" itself to students was a pretty easy one in both of these cases. Barron traces his interest in the field to a brother-in-law who is a chemical engineer, says he had a "natural liking for chemistry and for all engineering, even back in my early high school days."

Bechtler took a little more selling—he didn't decide on chemical engineering until his college sophomore year. "I was interested—from high school—in both chemical and electrical engineering. Once in college, I decided to go chemicals."

Both students missed out altogether on chemistry at high school; their emphasis was on college preparation.

Windup: Now that their college days are winding up, they're looking back on achievements. Both agree they're even more sold now on their chosen subjects than they were when they made their choices as sopho-

mores. They say their summer work clinched it for them. And although they like the field of chemical engineering, industry as a whole isn't their primary goal.

Barron hopes to eventually teach chemical engineering in a medium-size or large university "because that's where the larger part of research will be done." He adds, "I'll be going on to get my Master's degree after this June, but if I were looking for a job, I would want something in process engineering. The ideal job I have in mind would be one step away from production, but not purely theoretical."

Bechtler sets a different course. He is ripe for military service, will apply for a commission and seek assignment in special fuels and propellents for missiles. This obligation, he comments, puts him at a disadvantage in job interviews. He talked, last March, to representatives of more than half a dozen companies, but commitments either by him or by the interviewers weren't made until well after those of his classmates.

Salary Hopes: Asked about starting salaries they would look for if they were going into industry this June, both agree that "it's a shot in the dark, but $500/month would be somewhere near average."

Bechtler believes that "with the exception of the aircraft and petroleum industries, chemical processing offers the highest starting salaries to engineers." He feels there are other rewards than money: "there's lots of satisfaction in knowing you're constantly working toward improving a company's processing. That's a rewarding, but never-ending, job. This observable progress is the big thing for me. Career satisfaction, to my way of thinking, isn't necessarily related to money."

As to the matter of choosing between administrative and purely technical work, both prefer the technical side—at present. But Bechtler says he could certainly change his mind in a few years.

Barron says, "I prefer a technical-theoretical combination. But, salary-wise, administration has its advantage. The way I see it, technical and administrative people start at about the same salary. But after 10 years, those in administration start pulling ahead of people in strictly technical jobs."

Neither graduate has the slightest

interest in chemical sales activity.

Both look with enthusiasm to the future. They agree that "no field holds more promise during the next two decades than the chemical process industries. Chemical engineers will play a key role in the coming space-and-atom age." And both prefer big companies "because the larger company offers a bigger spread of work—more opportunities for advancement."

This preference has, in fact, worked out for both. On June 9, Bechtler starts work in processing for Celanese at Rock Hill, S.C., and Barron goes back to Union Carbide, in development work, at Charleston, W. Va. After the summer, his hopes will further crystallize when he assumes a fellowship at the University of Virginia to work toward his Master's degree.

Change-Minded

Latest change in company headquarters in the chemical processing industries is last week's announcement by United Carbon Co. that it will move its principal headquarters offices from Charleston, W. Va., to New York city and Houston, Tex.

Company President R. W. French says the move will be effected gradually, was dictated by geographical circumstances. The company's raw materials are now in the mid-U.S. and the Southwest.

A similar move is under study by Texas-U.S. Chemical Co. It's headquarters will be transferred from New York city to Port Neches, Tex.

LEGAL

Cloud-Seeding Debate: The Texas supreme court next week will hear oral arguments in a litigation between Texas ranchers and farmers over chemical cloud-seeding.

The case arose when Jeff Davis County farmers employed Southwest Weather Research, Inc., to seed clouds in the area in an effort to break up hailstorms said to originate in the Davis Mountains. The clouds were seeded from airplanes with silver iodide or salt brine. Ranchers in the area got an injunction to stop the seeding, claimed that it sometimes prevented rain.

The El Paso court of civil appeals upheld the injunction, but limited it to seeding over the property of the

ADMINISTRATION

complaining ranchers. The farmers, seeking to prevent formation of hailstones and subsequent damage to cotton crops, appealed to the state supreme court.

•

Capital Gains Tax: Oregon's state legislature has passed a capital-gains tax bill expected to make that state more competitive with Washington and California in the bid for new industry. The measure, if signed as expected by Gov. Mark Hatfield, would grant special tax treatment for capital gains reinvested in Oregon. Gains from property (capital assets) held over five years would be taxed at 50% of the regular tax rate; gains from property held two to five years, 60%; from property held one to two years, 80%. Capital gains on property held less than a year would be taxed at the full rate.

KEY CHANGES

Walter Hochschild to president, **Weston G. Thomas** to newly created executive vice-president, American Metal Climax, Inc. (New York).

Charles C. Hornbostel to corporate controller, Hooker Chemical Corp. (Niagara Falls, N.Y.).

Jerry McAfee, K. D. Nichols to directors, Callery Chemical Co., (Pittsburgh, Pa.).

Benjamin H. Dorman to corporate secretary, Rexall Drug and Chemical Co. (Los Angeles).

Jan Oostermeyer, Ulric Bray to directors, Los Angeles Soap Co. (Los Angeles).

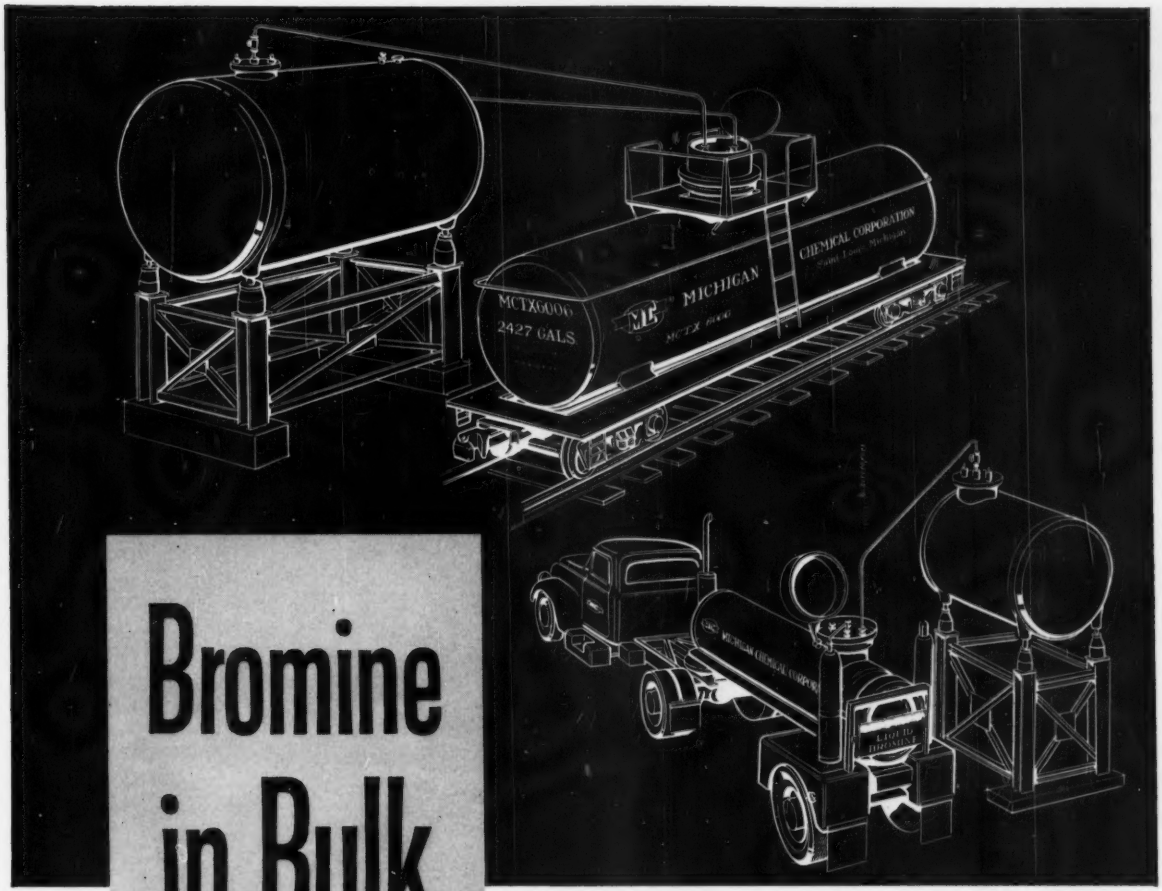
Arnold T. Reiche to assistant to the president, Allied Chemical International, Allied Chemical Corp. (New York).

Charles T. Harding to executive vice-president, Virginia-Carolina Chemical Corp. (Richmond, Va.).

Richard M. Furlaud to corporate vice-president, **Richard Bryce** to treasurer, Olin Mathieson Chemical Corp. (New York).

CONSULTANTS

Howard F. Bjork to general manager, W. L. Badger and Associates (Ann Arbor, Mich.), consulting chemical engineers.



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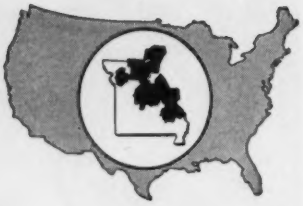

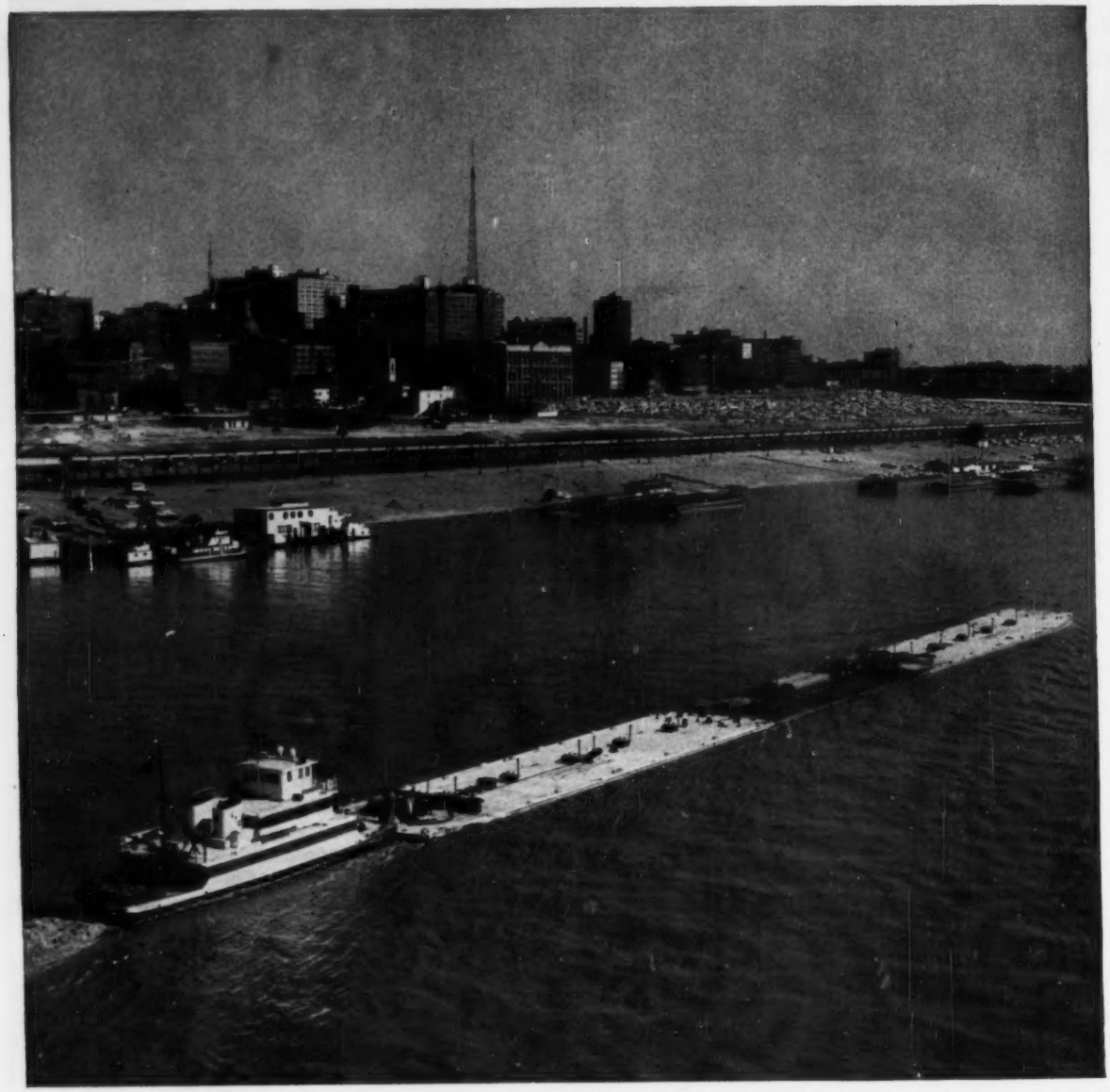

The mid-continent rivers make up the world's greatest inland waterway, connect 29 markets in 20 states.

contact: *J. E. Johanson, Manager, Industrial Development,*
UNION ELECTRIC CO., St. Louis 1, Mo.

Market Newsletter

CHEMICAL WEEK
May 23, 1959

U.S. aluminum stocks have been brought into better balance than they were in '58, as a result of stepped-up production in the U.S.

For example, Aluminum Co. of America last week reported restart of two 20,000-tons/year potlines—one at Point Comfort, Tex., the other at Vancouver, Wash. (These lines were idled in '57 and '58 when inventories began to get out of hand.) Restarting the lines will push the firm's operating capacity to 82% of installed total capacity of 798,250 tons/year.

Aluminum prospects keep on improving in some areas outside the U.S.

Prompted by increased foreign consumption, Reynolds Metals Co. last week revealed that its subsidiary, Reynolds International Inc., will build a $6-million aluminum extrusion plant in Venezuela—with Venezuelan capital participating. Plans also call for construction of an aluminum sheet and foil plant and a foil-converting unit at a later date.

But outlook for Canada's aluminum industry isn't as bright because of loss of big markets in the U.S. and United Kingdom. Aluminum Co. of Canada recently reported a 5% reduction in smelter operation in order to better coordinate output with sales, prevent further inventory increases. The production cuts were made at Kitimat, B.C., and Beauharnois, P.Q.

Earlier this month Nathaniel Davis, president of Alcan's parent company, Aluminium Ltd., predicted lower sales and earnings in '59 than in '58, announced Canadian aluminum production would be cut back to a 500,000-tons/year rate. Operations of an associated export smelter in Norway is also reportedly being reduced.

•

A shortage of uranium in non-Communist nations by '70 is predicted by British producers. The forecast, made by Gerald Coke, chairman of Rio Tinto Ltd., envisions increased demand, small annual production growth (unless new sources are discovered and developed), and dwindling of currently excess supplies.

Rio Tinto now accounts for about 15% of non-Communist uranium output (in fact, uranium production last year partly helped offset the firm's severe cuts in copper earnings). Rio has a new uranium mine in operation in Australia, where further large-scale exploration is under way; the firm also produces more than 40% of all Canadian uranium from its seven Dominion mines.

Step-up of uranium demand necessitates revision of forecasts made three years ago, according to Coke. Original estimates put '75 de-

mand for the mineral in the 10-15,000-tons/year range for military uses, about 10,000 tons/year for civilian needs.

Although military requirements depend mainly on outcome of talks on limitation of nuclear tests and weapons, Coke says, the U.S. alone will require about 27,000 tons/year after '60. Total non-Communist uranium output, Coke notes, was about 30,000 tons in '58, will increase to an estimated 35,000 tons this year.

•

Cellophane will account for more than 50% of the billion-pounds/year packaging film market expected in '68, according to Donald Carpenter, general manager of Du Pont's Film Dept. At the formal opening of the firm's new, 50-million-lbs./year cellophane plant at Tecumseh, Kan., last week, Carpenter also said cellophane production last year—despite the recession—hit a record high of more than 400 million lbs.

The plant at Tecumseh (which boosts total U.S. cellophane capacity to an estimated 550 million lbs.) went into operation earlier this year, but full-scale production was reportedly a full year off (*CW Market Newsletter, Jan. 17*).

•

This week a new factor entered into the U.S. castor oil picture (*see also page 39*). French-made Type 11 nylon resins—which are made from castor oil—will be marketed in this country by Belding Corticelli Industries, following signing of an agreement with Organico S.A. (France). But BCI plans to produce in the U.S. "at an early date." Specified startup date awaits initial marketing of foreign-made product. BCI officials tell *CW* the firm will want to use U.S.-produced castor oil "if it's available."

•

New gambit in Union Carbide's selling to protective coatings industries is the appointment of two distributors—H. D. Litter Co. (New York) and Harry A. Baumstark and Co. (St. Louis)—to supplement Carbide's own sales force. They will handle: vinyl acetate latex, vinyl solution resins and phenolic resins.

SELECTED PRICE CHANGES—WEEK ENDING MAY 18, 1959

	Change	New Price
UP		
Castor oil, No. 1, Brazilian, tanks	$0.015	$0.1725
Cocoa butter, bgs.	0.01	0.74
Corn oil, crude, tanks	0.005	0.13375
Tin metal (Straits)	0.00375	1.03
DOWN		
N-Butyl acrylate, tanks	$0.05	$0.40
Blood, dried, high-grade, unground, 16-17% ammonia, bgs., Chicago, ton	0.25	6.75
Tankage, animal, feed, 9-11% ammonia, Chicago, ton	0.25	6.75

All prices per pound unless quantity is quoted.

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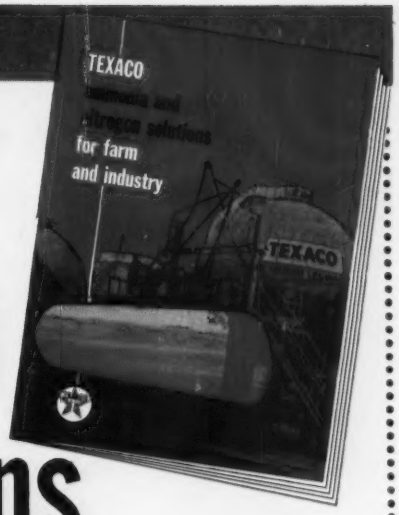

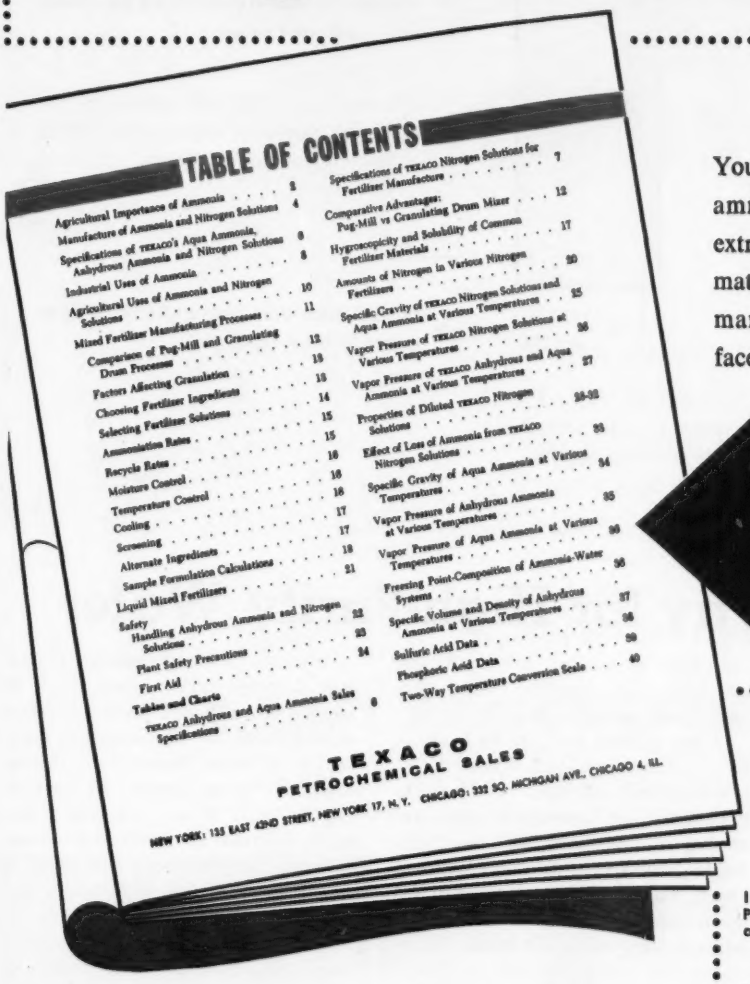

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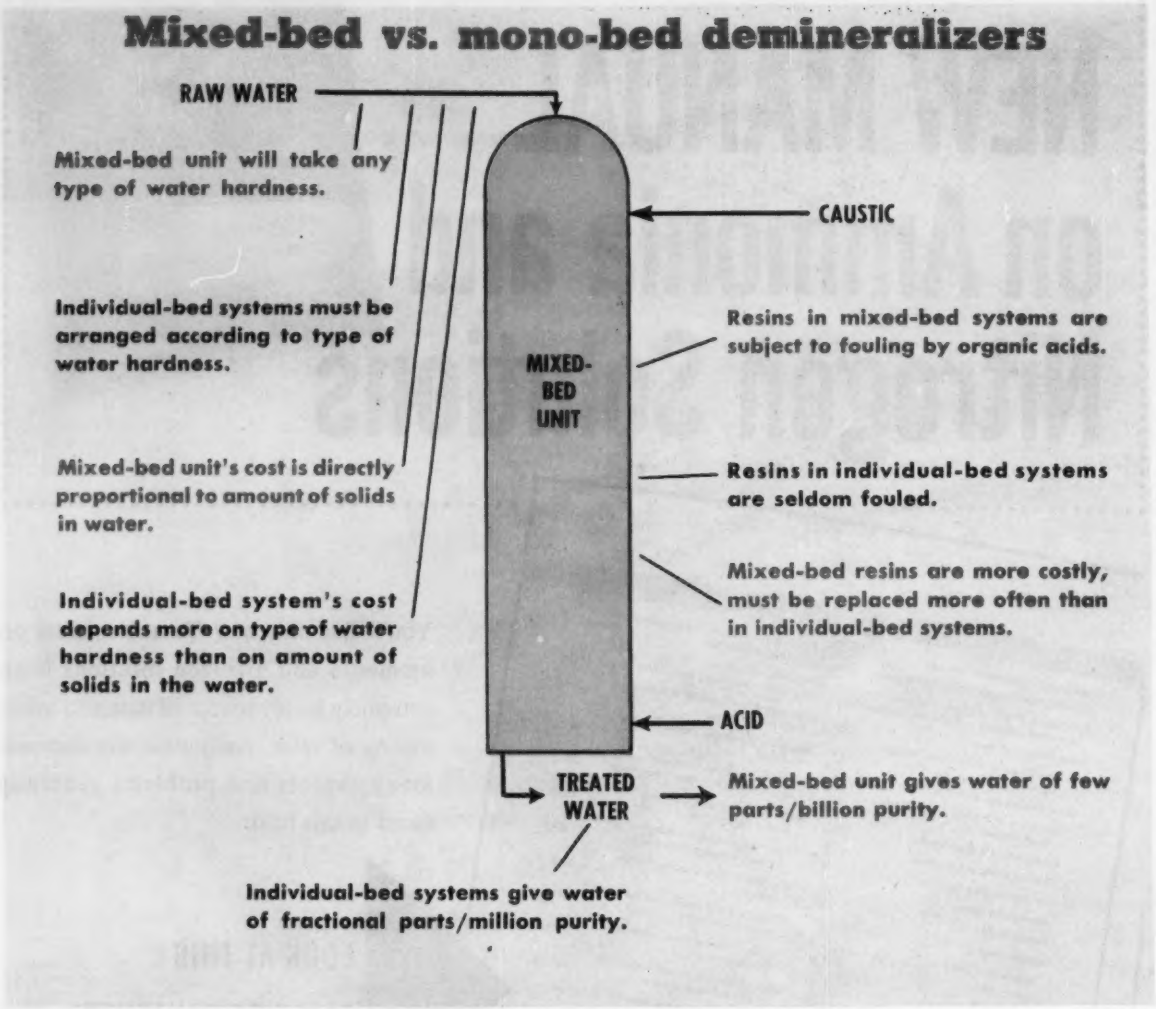

Clearing the Way for High-Purity Water

Despite their widespread adoption for water purification, a few industries have given a cool reception to mixed-bed demineralizers. But this week there are signs of growing warmth and hints of even more widespread adoption of the mixed-bed systems. Reason: a simple, more effective installation of the units.

For example, Bogue Electric's Belco Division is readying a mixed-bed system for shipment to Tennessee Eastman's Kingsport, Tenn., plant, where it will be used as the final step for obtaining high-purity water at 2,500-gpm. rates for processing and for high-pressure power steam. And, at Harrisburg, Pa., Peter J. Schweitzer, Inc., is putting a second unit onstream for purifying water for high-quality papermaking.

A key to these applications is placement of individual-bed systems (e.g., a cation unit followed by an anion unit) ahead of mixed-bed units. According to companies such as Philadelphia Electric and the Cochrane Corp., this plan can overcome the shortcomings of mixed-bed units. The primary units carry out initial purification; the mixed-bed unit "polishes" the water to final high purity. "We've learned not to use a race horse for a work horse's job," says Samuel Applebaum, director of Cochrane's Water Treatment Division.

Warmth, Then Coolness: Mixed-bed demineralization dates back to about 1950, although demineralization started about '36. The units had limited use in power plants. Early demineralizers—cation devices for converting the salts in the raw water into acids, followed by anion units to absorb the acids—wouldn't remove silica, which wound up on power-plant turbine blades, lowered turbine efficiency. But about '47, stronger basic anion units that removed silica were developed.

Then Rohm & Haas researchers found that cation and anion resins could be combined in a single unit, separated hydraulically for regenera-

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tion. Illinois Water Treatment started development of commercial units; it still claims, without argument from others, that it is the largest producer of mixed-bed systems.

Initial reaction to mixed-beds was warm. They offered water purity that individual multibed systems couldn't attain (water with a few parts per billion solids, compared with fractional parts per million). And, a single shell (or tank) to hold both cation and anion resins saved considerable plant space.

Some of the other water-treatment companies quickly followed Illco. But a few foresaw problems with mixed-bed units, hung back for a time, then eventually followed the Illco lead. Companies such as Belco, Cochrane, Dorr-Oliver, Graver, Permutit all have put in major installations.

Organic Fouling: Problems were soon encountered. One early problem, overcome by design, resulted from pressure buildup during regeneration (the anion resin swells). But the biggest headaches were caused by organic fouling of the anion resin.

This organic matter in the raw water can cut the mixed-bed unit's trouble-free operation time to one-tenth the theoretical time, according to Durando Miller, Permutit's technical manager. And, regeneration won't correct the problem. Resin replacement will — but it is costly. Hypochlorites, which remove the organic acids, damage the resin. Washing with warm brine is one of the few helpful treatments.

Illco claims that the problem could be forestalled by pretreatment of the water — chlorination, oxidation, filtration. Others haven't been as positive. Now thought more effective are individual-bed primary units, followed by the mixed-bed units. The individual-bed units are not fouled to a great degree, prolong the life of the mixed-bed units.

Mixed-bed units supplied with raw well water don't seem to have the organic fouling problem. And, mixed-bed units supplying smaller quantities of water (e.g., in laboratories) often perform satisfactorily without the need for preceding individual-bed systems. Firms such as Barnstead and Penfield mainly offer the smaller units.

There is still debate about the power industry's current reception of mixed-bed units for power plants. The trend seems to be away from them, according to Permutit's Miller. For one thing, many power plants are still more concerned about the amount of silica in the water than about ultra-high-purity water, he says. Initially, it was thought that mixed-bed systems would remove more silica than an individual-bed system; but results often show there is little to choose between.

Cochran's Applebaum, on the other hand, feels that there has been no real swing away from mixed-bed systems. Companies are merely placing individual-bed units ahead of the mixed-beds, using the mixed-beds for "polishing." But all the water treatment companies agree that unless very-high-purity water is required, mixed-bed units aren't required.

Pros and Cons: Mixed-bed systems save on space requirements. But overall costs may favor other systems. Mixed-bed costs are directly proportional to the amount of solids in the water. The cost of individual-bed units, because of the number of arrangements possible, depends on the type of water hardness (e.g., content of sodium, calcium, magnesium, chlorides, carbonates). It's possible for treatment of some higher-solids waters to cost less than some lower-solids waters.

And, when solids rise — above 1,000 parts per million — ion-exchange systems in general lose out on economics. For example, Ionics, Inc., is now attempting to pin down the breakeven point between ion exchange and electrodialysis in terms of salinity of feed water. It now estimates that it is 500-1,000 ppm.

Above this point, electrodialysis is valuable as a first step in demineralization. Example: a Texas Electric Service installation at Monahans, Tex., where electrodialysis reduces mineral content from 600 ppm. to 350 ppm. Ion exchange is then used for final purification.

At still-higher hardness, evaporation methods are most economical.

Chemical Costs: Regeneration costs will vary between ion exchange systems. Illco's director of research, Curt Reents, estimates that regeneration costs of mixed-bed systems are about 10-15% higher than for individual-bed systems because the regeneration process is not as efficient. Belco's

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vice-president, Bob Herwig, feels that acid and caustic usage for mixed-bed systems are about comparable to individual two-bed systems. Herwig's rule of thumb for chemical usage costs: a little more than 1¢/1,000 gal. of water for each grain of hardness (1 grain/gal. is equivalent to about 17-ppm. hardness).

But regardless of cost, there is no doubt that mixed-bed systems will be used for process water when ultrapure water is needed. And, in power plants, where the trend is to higher pressures and once-through boilers that eliminate the steam drum, ultrapure water is such a requirement.

Also, Applebaum points out, condensate, which once was returned directly to lower-pressure boilers, will now have to be purified (perhaps by mixed-bed demineralizers) for the supercritical boilers (over 3,200 psi.). In subcritical boilers (1,800-2,400 psi.), the trend may be to scavenging also if hydrazine, ammonia and other chemicals fail to prevent salt deposits in turbines.

The mixed-bed systems, using high flow rates (rates of 100 gal./sq.ft./-minute are now being researched for these uses; normal rates for mixed beds are below 10 gal./sq.ft./minute), seem ideally suited to this use.

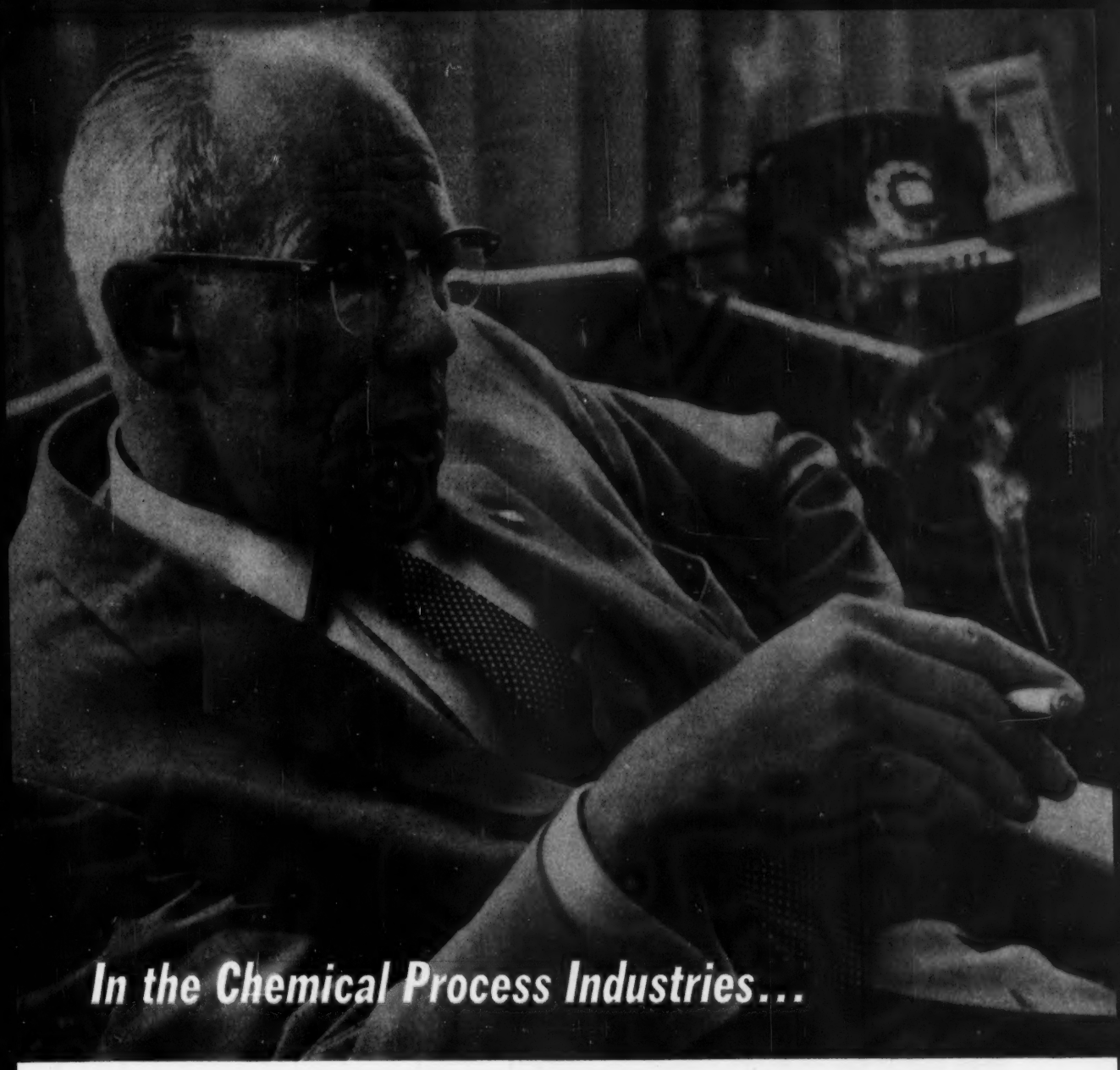
The opportunities for mixed-bed demineralizers are plain — and the improved installation ideas can make them qualify.

EQUIPMENT

Mass Flowmeter: A meter that registers fluid flow directly in pounds has been developed by General Electric Co.'s Instrument Dept. (Schenectady 5, N.Y.) and Black, Sivalls and Bryson, Inc. (Kansas City, Mo.). The "true mass" flowmeter is said to give precise weight measurements over wide ranges of flow rate, pressure, temperature and density. No additional measurements and corrections need be made. The instrument will be available in early '60 from GE and (for the natural gas industry) from BS&B.

•

Unspliced Hose: Goodyear Tire & Rubber Co. (Akron, O.) is now offer-2- to 8-in. (ID) rubber hose made in continuous reels without splicing. Length is limited only by capacity of buyer's freight carrier.



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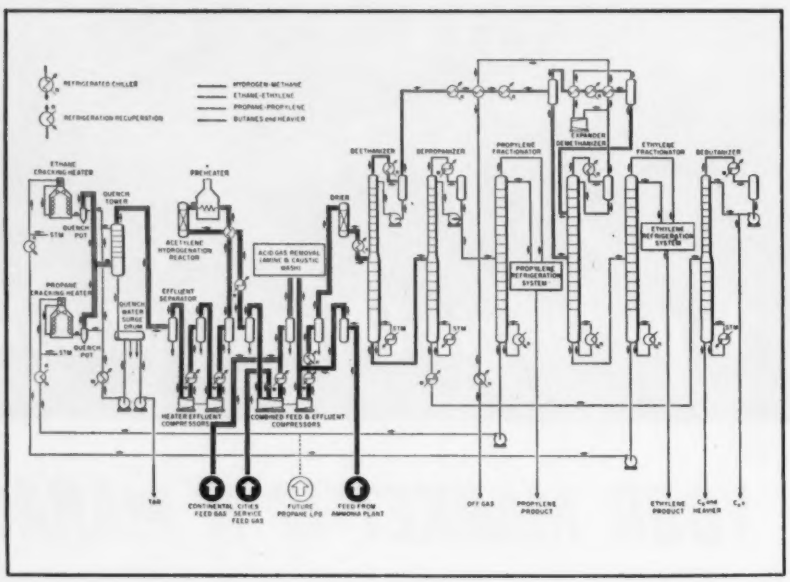
Chemical Week

NEW ETHYLENE PROCESS DEVELOPED BY LUMMUS PROVIDES HIGH EFFICIENCY, UNUSUAL FEED-STOCK FLEXIBILITY

200,000,000 Lb/Year Plant for Petroleum Chemicals, Inc. Produces 99.7% Ethylene

The new Petroleum Chemicals, Inc. ethylene plant, now on stream at Lake Charles, Louisiana, incorporates a unique ethylene separation process developed by Lummus which provides high separation efficiencies and unusual flexibility and reliability (See flowsheet).

Lummus has designed the plant for rapid 50% expansion to a rate of 300,000,000 lbs/year. Ethylene is produced in two grades — the highest, 99.7%; the other, 98%. Co-products are high purity propylene, a butane-butylene fraction and aromatic distillate. Operations have been marked by continuous production of specification ethylene under widely varying rates and feed stock compositions.



Feed Gases From Three Sources

Feed gases for the P.C.I. plant are provided from three different sources: the nearby refineries of Cities Service and Continental Oil—by whom P.C.I. is jointly owned—and P.C.I.'s new ammonia plant.

High Efficiency Expanders

All major compressors in the Lummus-designed low temperature fractionation unit are driven by three 12,500 HP gas turbines. Gas turbine exhaust serves as preheated air for three high pressure steam generators. High efficiency expanders provide low temperatures for maximum ethylene recovery.

Ethylene is delivered via pipeline to customers at Orange, Texas. In addition, part of the new plant's output feeds the adjacent Calcasieu Chemical Corporation ethylene oxide and glycol plant, also engineered and constructed by Lummus.

This plant brings the total of Lummus-designed ethylene plants to 13, with a combined capacity of over 1 billion pounds per year: (contd. next page)

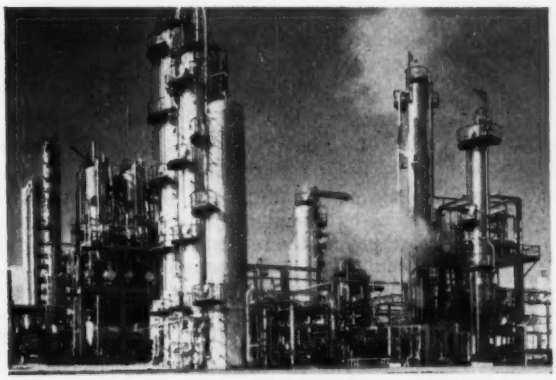
CUSTOMER	LOCATION
Monsanto Chemical Co.	Texas City, Texas, U.S.A.
Jefferson Chemical Co.	Port Neches, Texas, U.S.A.
E. I. du Pont de Nemours & Co.	Orange, Texas, U.S.A.
Texas Eastman Co.	Longview, Texas, U.S.A.
Gulf Oil Corp.	Port Arthur, Texas, U.S.A.
Societe Naphtachimie S.A.	L'Avera, France
Allied Chemicals Corp.	Tonawanda, New York, U.S.A.
National Petrochemicals Corp.	Tuscola, Illinois, U.S.A.
Canadian Industries, Ltd. (2 plants)	Edmonton, Alberta, Canada
Polymer Corporation Ltd.	Sarnia, Ontario, Canada
Societa Edison	Mantova, Italy
Petroleum Chemicals, Inc.	Lake Charles, La., U.S.A.

New Ethylene Oxide-Glycol Plant is third Shell process unit engineered and built by Lummus

Calcasieu Chemical Corporation's new ethylene oxide-glycol plant at Lake Charles, Louisiana is on stream and producing 8,000,000 gallons annually of ethylene glycol or 57,000,000 pounds of ethylene oxide.

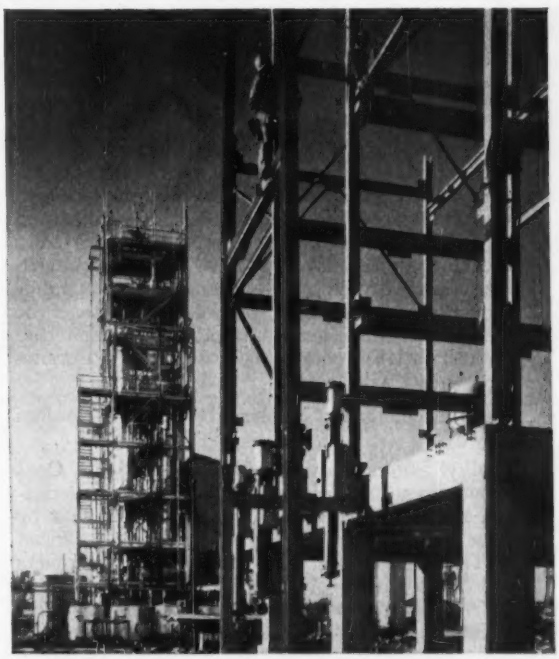
Designed and engineered by The Lummus Company, the plant utilizes the two-step Shell Development Company Process, which offers the advantages of unusually high yields and virtual elimination of the waste-disposal problems encountered in the Chlorohydrin Process. The first step is direct catalytic oxidation of ethylene with oxygen in fixed bed reactors. Here ethylene oxide, valuable petrochemical intermediate, is produced for use by manufacturers of detergents and other surface active agents, plasticizers, solvents, textiles, drugs and many other petrochemical compounds.

The second step of the Shell Process calls for thermal hydration of ethylene oxide to ethylene glycol, essential to manufacturers of antifreeze, explosives, plasticizers, fibers, resins, hydraulic fluids and many more chemical products.



Article tells when to contract for pilot plant work, when to 'do it yourself'

Reprints are available now of a four-page article which discusses factors to consider in deciding when to engage an outside firm to do pilot plant work and when to "do it yourself." The article includes a comparative analysis of costs on a specific project: (a) as actually completed by Lummus for a client and (b) if the client had undertaken the program himself. For copies, write Lummus.



MORE POLYVINYL ALCOHOL RESIN — 20 million pounds per year — will come from Air Reduction's new installation in Calvert City, Kentucky, now being engineered and built by Lummus. Shown above are Airco's original vinyl acetate monomer plant and the beginning of the new monomer plant which will double vinyl acetate output. The twin monomer plants will be the core of the huge polyvinyl alcohol resin operation, scheduled to come on stream early next year.

New information about TRIALKYL BORANES

"colorless, liquid organoboron compounds, Triethylborane and Tributylborane are most useful as polymerization catalysts"

C. J. Wiley
A.B. University of Pennsylvania
M.S. University of Massachusetts
Manager, Market Development
Callery Chemical Company

Q. Mr. Wiley, are there any new and unusual reactions of Trialkyl Boranes that deserve attention?

A. The alkyl groups of Trialkyl Boranes isomerize at temperatures on the order of 160° C. This means that Trialkyl Boranes can be used in exchange reactions to isomerize internal olefins to terminal olefins. Also, either type of olefin may be used to produce terminal (primary) alcohols by oxidation of the isomerized Trialkyl Borane. For example, mixed hexenes give a ninety per cent yield of 1-hexanol by this process.

Q. What are the reasons for interest in Trialkyl Boranes as catalysts?

A. They promote polymerization of vinyl-type monomers at lower temperatures than are practical with other catalysts. The result is increased regularity in the polymers. Thus, vinyl chloride is polymerized to a product that is insoluble in solvents for conventional poly (vinyl chloride). Among other compounds polymerized by Trialkyl Boranes are methacrylic and acrylic esters, acrylonitrile, styrene. Emulsion polymerization is possible because Trialkyl Boranes do not react with water.

Q. Is the mechanism of catalysis by Trialkyl Boranes known?

A. Trialkyl Boranes are peroxide-type catalysts. Controlled amounts of air greatly increase polymerization rates. Monomers that are polymerizable by other organic peroxides are effectively polymerized by Trialkyl Boranes. Also the ratios of monomers incorporated in copolymers are typical of catalysis by free radical initiators and not of ionic catalysis. (J. Polymer Sci., Vol. 33, No. 126, p. 503)

Q. Can olefins be polymerized?

A. In the presence of suitable co-catalysts, high molecular-weight crystalline polyethylene and polypropylene are formed, according to U. S. Patent 2,840,551.

Q. How stable are Trialkyl Boranes in common solvents?

A. Oxidizing agents, including air, must be avoided, but otherwise boron-carbon bonds are very stable. Triethylborane and the higher Trialkyl Boranes are generally soluble in hydrocarbons, insoluble in water, and not reactive with either. They are miscible with most organic solvents. It should be remembered that Trialkyl Boranes are reducing agents at higher temperatures.

Q. Is it true that the higher Trialkyl Boranes are less pyrophoric than the Trimethyl and Triethyl compounds?

A. Yes, spontaneous flammability decreases as the molecular weight of the *n*-alkyl group increases.

Q. Can Trialkyl Boranes be used as oxygen scavengers?

A. Yes, their reactivity with oxygen would certainly permit this possibility for specialized applications.

Q. What Trialkyl Boranes are offered?

A. Plant flexibility at our Lawrence, Kansas plant will permit us to produce a variety of Trialkyl Boranes such as: Tri-*n*-propylborane, Triisobutylborane, Tri-*n*-hexylborane, and others. Triethylborane and Tri-*n*-butylborane are now available in pound quantities. A 20 ml sample of Triethylborane or Tri-*n*-butylborane will be shipped on letterhead or purchase order request, if you will authorize billing of the $30.00 deposit on each returnable cylinder.

Write or phone for specific information on the Trialkyl Boranes.
Phone: FOrest 4-1130 TWX: Perryswille, Pa. 117
9600 Perry Highway, Pittsburgh 37, Pennsylvania

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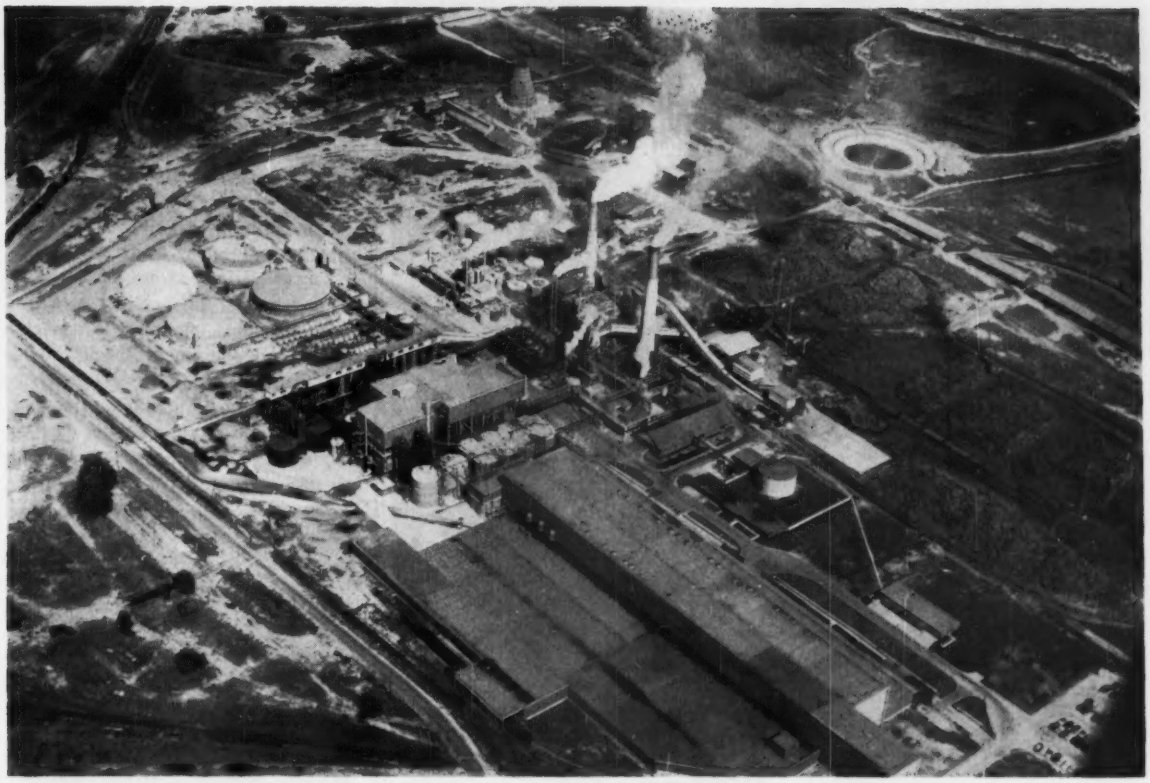


Buckeye Cellulose's Foley, Fla., pulp mill was doubled in capacity—for 10% less expense than expected.

Double-Teaming Trims Construction Costs

This week at Foley, Fla., deep in the slash-pine country along the Gulf Coast, Buckeye Cellulose Corp. is completing shakedown operations on final process sections of its recently expanded cellulose pulping plant (CW Technology Newsletter, May 16). The company is satisfied with the smoothness of prestartup tests, attributes the trouble-free handling of the $20-million expansion to its new team approach in engineering project management.

According to Paul Honey, vice-president and manager of Buckeye's Cellulose & Specialties Division, the new management technique is a natural evolution that has been developing for a long time both at Buckeye and at Procter & Gamble Co. (Cincinnati, O.), its corporate parent. Basically, what Buckeye did was to break down the over-all project into distinctly separate areas of responsibility—design and engineering and construction. It then assigned an engineer to work side by side with the contractors' project engineers for each phase of the project.

The Foley expansion was conveniently divided into three main areas: the power plant, engineered by Sargent & Lundy (Chicago) with the help of P&G team members; the pulp-mill processing area, handled by Lummus Co. (New York); the wood yard and much of the general construction, done by Triangle Construction Co. (Tallahassee, Fla.). Triangle also handled the construction of the Sargent & Lundy-designed power plant.

The advantages of this team approach are evident in Buckeye's results:

- Costs were reduced to 10% below the company's original estimate, judging by cost of the original Foley installation.
- Construction schedule set in '57 was comfortably met, with little overtime.
- Trouble-free startup of the new departments have been accomplished with a minimum of modifications needed to put the units into full-scale operation.

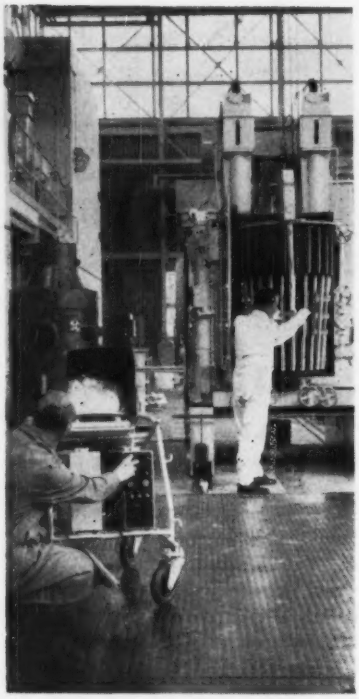
Strengthening the Team: Honey managed the project at its inception in '56, is given much of the credit for developing the team technique.

On many previous construction jobs, Honey observed that some resident engineers did better jobs than others. Those consistently turning in the best results, he noticed, were strong in engineering, gained the confidence of the contractor and participated in the job. On the other hand, many resident engineers served mainly as auditors, without actively participating in decision-making.

Buckeye's departure from the conventional type of job organization stemmed largely from its belief that

even the most competent contractor couldn't learn enough about the detailed requirements of a highly competitive processing plant to give the firm exactly what it wanted. By teaming production experience of its own engineers with the design and construction know-how of the contractors' experts, Buckeye feels it achieved the best possible engineering job for the lowest possible cost. Here's how the engineering teams worked together at various stages of the job:

Fundamental engineering work, including layouts, flowsheets, capacity studies and equipment specifications, were handled at Buckeye's engineering offices in Memphis. For six months, the Buckeye member of each



More Nuclear Power

Britain's newest nuclear power station, at Chapel Cross, Dumfriesshire, Scotland, was dedicated recently after the four reactors were loaded with "baskets" (*right*) of fuel elements. A mobile TV screen (*left*) is hooked up with a camera inside the reactor for inspection before and after loading. The Chapel Cross station cost $95.2 million, will deliver 140,000 kw. to the national power grid, is already feeding 23,000 kw.

team took the lead, aided by his contractor teammate. To insure continuity and standardization of design between areas, all of the engineering teams got together at weekly meetings to coordinate individual projects.

Upon completion of the fundamental engineering phase, the teams moved to the contractors' home offices for detailed design and drafting work. This stage was headed by the contractor-member of the team, with his Buckeye counterpart serving as a consultant. Experience acquired by the contractors' men during the first stage, says Buckeye, helped to speed the design work to completion in just seven months.

Field Authority: An important feature of the plan during the actual construction of the plant was the delegation of authority to the engineering teams to make decisions in the field without home-office approval. Lee Wakeman, now the plant manager at Foley, who served as Buckeye's construction manager on the project, believes that freedom to make on-the-spot decisions enables field engineers to make significant savings.

For example, one of the buildings at Foley is equipped with a crane needed for servicing process equipment. Ordinarily, the crane would not be installed until after concrete flooring was poured and, in some cases, until some of the equipment was installed. The team responsible for this portion of the project cut construction costs by installing the crane first, then using it for pouring the concrete.

Wakeman estimates that about 30% of a project's cost is field-controlled expenditures, with the other 70% going for equipment and major subcontracts. By breaking down the job responsibilities, each team was able to allocate efficiently and account for every dollar spent in its particular area. Here are some of the costs that the project teams controlled:

- Overhead costs. Management usually worries about these costs, tries to keep them low. While the team approach tends to increase overhead, it likely more than offsets any increase by effecting larger savings down the line.
- Surplus equipment costs. Many companies like to wind up a job with no surplus equipment. Buckeye's project teams weighed the cost of construction time that could be lost be-

CHEMICAL WEEK • ADVERTISERS' INDEX

May 23, 1959

tracers SECTION

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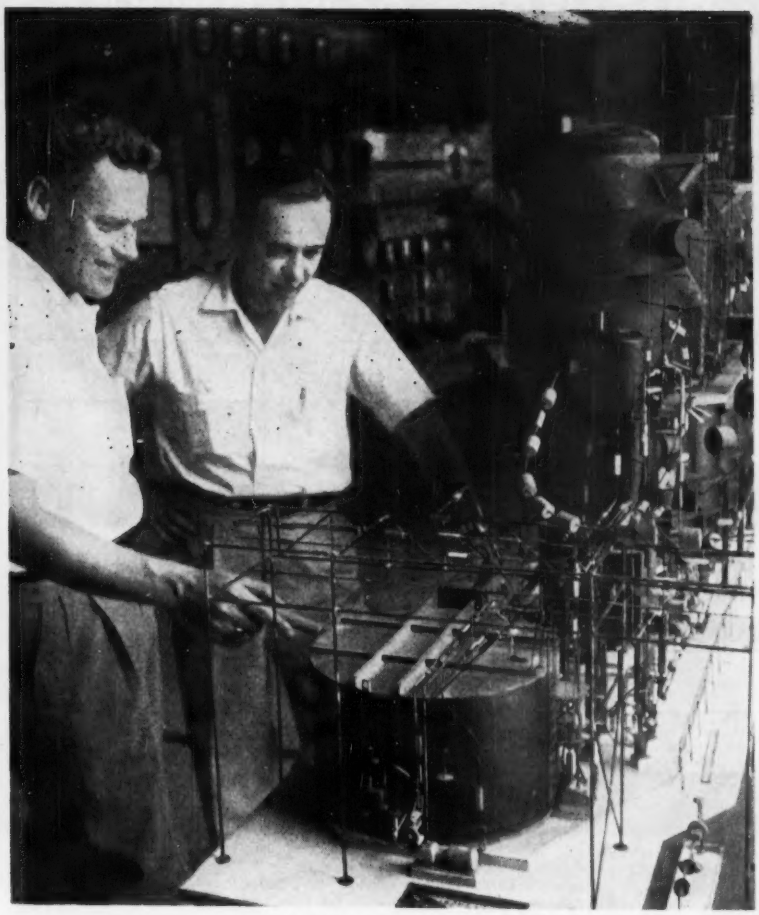


Buckeye's Tougas (left), Wakeman discuss cost savings in modeling.

cause of damage or loss of necessary components, decided to maintain a 3-4% excess of stock. Difference between original purchase price of the surplus items and their resale value after the job was completed, the field teams felt, was worthwhile insurance against a construction delay.

• Overtime work. The team approach enabled project managers to settle quickly on "spot overtime."

• Manpower peaks. Team scheduling of work controlled peak demands for special crafts, thereby minimizing fluctuations in the required labor force. It also simplified supervisory problems by limiting the number of workers on any given job.

Adaptability: Buckeye is the first to admit that this team approach isn't suited to every type of construction project. For example, it wouldn't apply to a turn-key plant, for which the contractor assumes full responsibility. Nor would it fit the needs of a simple job, such as the engineering design and construction of a single process unit.

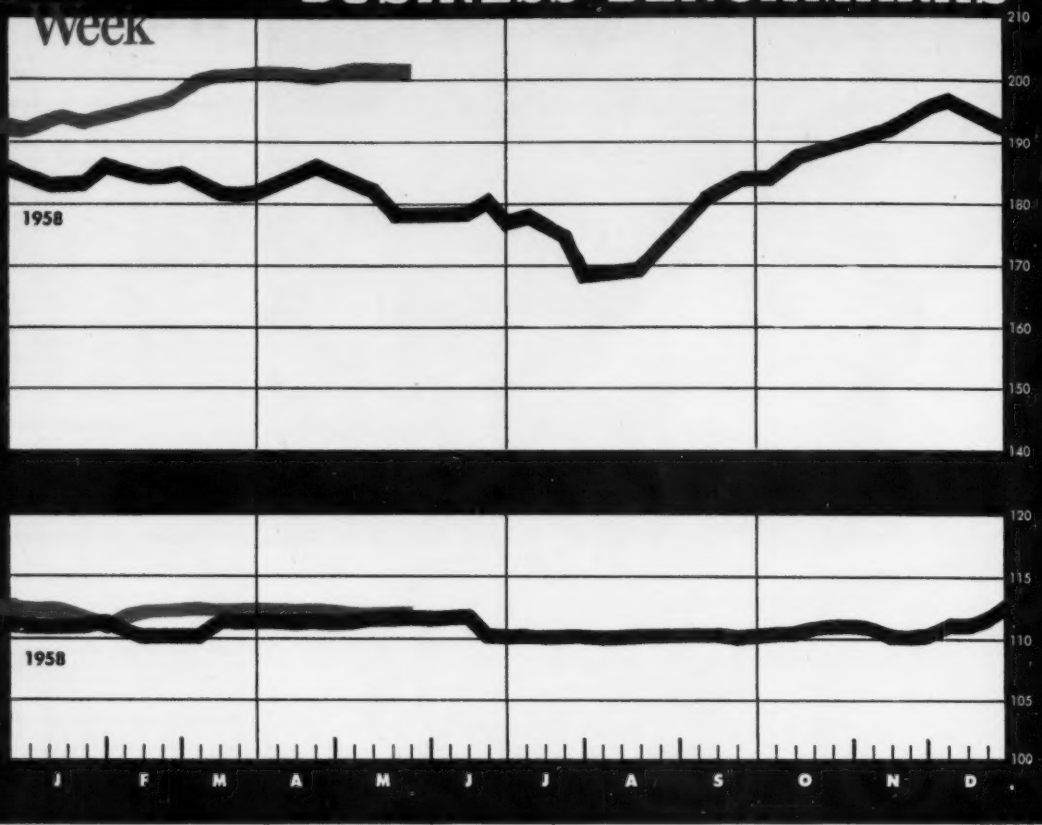
The company considers the Foley expansion the best-staffed job it has obtained to date.

Buckeye's management group for the project was headed by Honey, who was named a vice-president when the job was 75% complete. Gil Tougas then moved up from plant manager to the project manager job, is now manager of the Florida operation.

Lee Wakeman's construction management group consisted of 10 other team members, including four from P&G. Bob Ganoung, associate director of technical division at Memphis, managed the engineering group, was aided by eight Buckeye and two P&G engineers.

The savings in time, money and startup accrued in this teamwork further strengthens Buckeye's faith in the engineering management team idea.

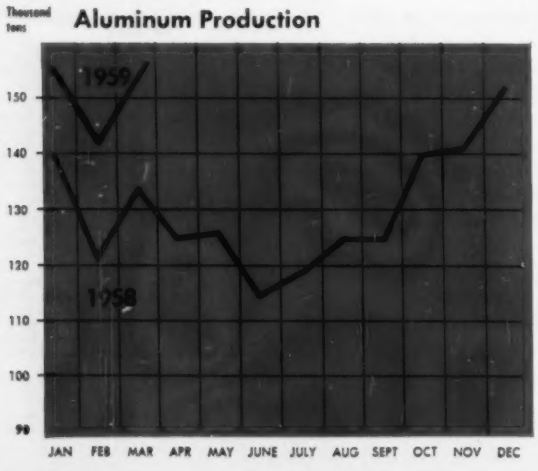
BUSINESS BENCHMARKS

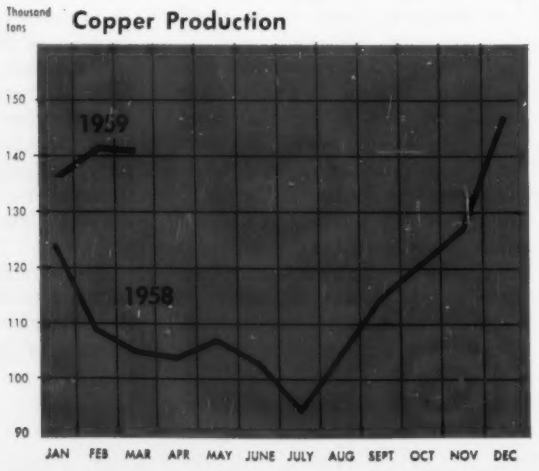


MAY 23, 1958

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-1949=100)	201.7	201.5	179.5
Chemical Week wholesale price index (1947=100)	112.4	112.4	111.0
Stock price index (11 firms, Standard & Poor's)	59.29	57.38	38.70
Steel ingot output (thousand tons)	201.7	201.5	179.5
Electric power (million kilowatt-hours)	12,659	12,546	11,315
Crude oil and condensate (daily av., thousand bbls.)	7,225	7,113	6,245

MONTHLY INDICATORS—Foreign Trade (million dollars)	EXPORTS Latest Month	EXPORTS Preceding Month	EXPORTS Year Ago	IMPORTS Latest Month	IMPORTS Preceding Month	IMPORTS Year Ago
Chemicals, total	122.2	116.6	120.2	30.4	27.5	24.3
Coal-tar products	8.0	8.2	8.2	5.5	5.9	4.1
Industrial chemicals	19.6	17.8	15.3	8.8	9.2	6.7
Medicinals and pharmaceuticals	23.7	23.5	25.4	1.8	1.4	1.1
Fertilizers and materials	10.5	11.5	8.4	12.2	9.3	11.9
Vegetable oils and fat (inedible)	5.3	3.1	3.5	7.8	7.3	7.4





airborne silica . . . it's white magic! a pinch of **CAB-O-SIL®** works "free-flow" magic with caky sulfur

Add just 0.4% Cab-o-sil, shake — and caky sulfur (left) is transformed into a free-flowing powder (right). As an anticaking agent, this super-fine silica (11.1 million billion particles per gram) is used in amazingly low concentrations.

A mere pinch of Cab-o-sil®, the super-fine airborne silica, transforms sulfur, insecticides and other materials which tend to cake into smooth-flowing powders while maintaining desirable product properties.

Whether Cab-o-sil performs its anticaking magic by acting as a "dry lubricant, or whether its billions of spherical particles actually function like so many tiny ball bearings in separating the larger, caky particles, is not precisely known. But one thing is sure: Cab-o-sil does the job . . . and in amazingly low concentrations (down to 0.25% in some cases).

Yet anticaking is just one of many useful characteristics of this versatile raw material. Here are just a few of the ways Cab-o-sil is being used today:

CABOT.

USES:

- **Thixotropic, thickening, gelling agent** — lubricating oils, greases, polyester resins, epoxy resins, plastisols, plastigels, organosols
- **Suspending agent** — paints
- **Flatting agent** — varnishes, lacquers, organosols, plastisols
- **Reinforcing agent** — rubber, silicone, latex film
- **Anticaking agent** — sulfur, insecticides
- **Antislip agent**—solvent-base floor waxes
- **Precoating material** — reproduction paper
- **Low temperature thermal insulation**
- **Pharmaceuticals and cosmetics** — **(See bulletin #cpha-1)**

FREE CAB-O-SIL® sample and bulletins.

Minerals & Chemicals Div., CW **GODFREY L. CABOT, INC.,** 77 Franklin Street, Boston 10, Mass.

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( ) Cab-o-sil in the Rubber Industry (#crub-1)
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( ) Cab-o-sil in the Lubricating Grease Industry (#cgre-1)
( ) Aqueous Dispersions of Cab-o-sil (#cmis-2)
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( ) A Flatting Agent for Varnishes (#cpai-3)
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Sulfan offers more than 99% available SO_3 in easy-to-handle liquid form

- nine times as much usable SO_3 as 100% sulfuric acid
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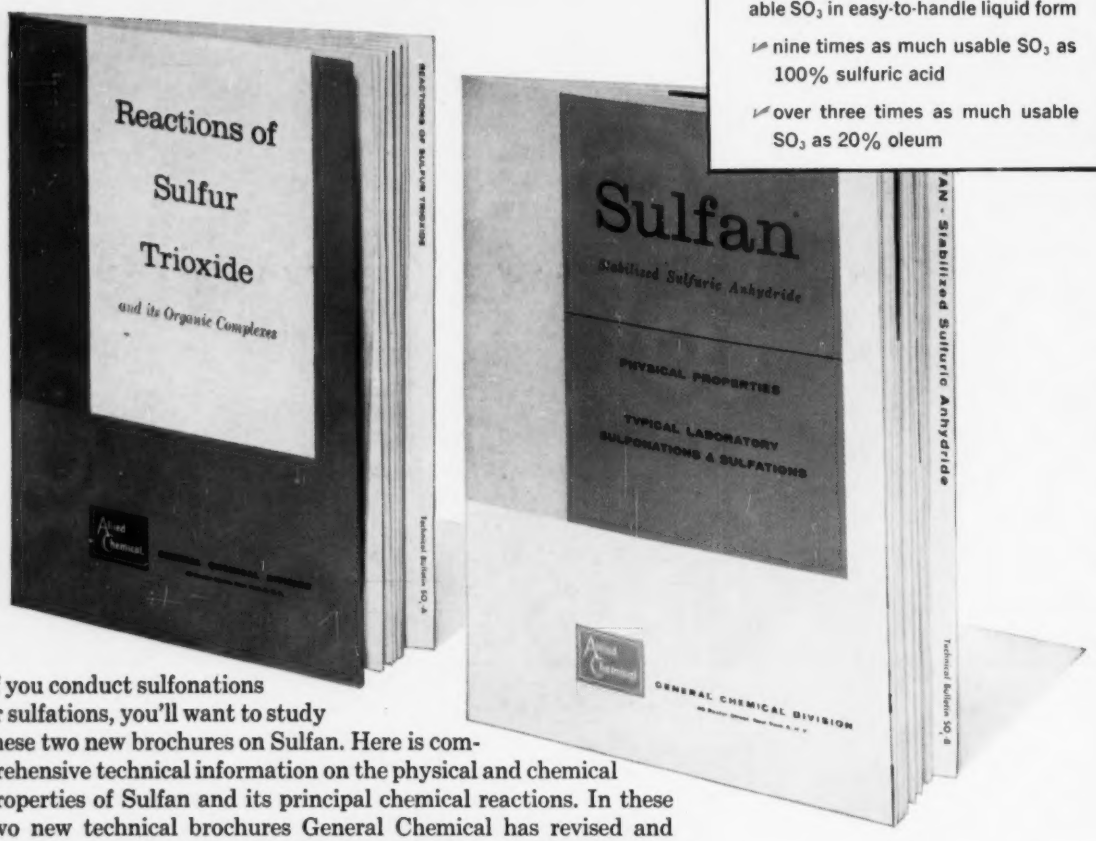

If you conduct sulfonations or sulfations, you'll want to study these two new brochures on Sulfan. Here is comprehensive technical information on the physical and chemical properties of Sulfan and its principal chemical reactions. In these two new technical brochures General Chemical has revised and brought up to date the literature previously available on Sulfan. New information has been incorporated. Be sure to send for your copy of:

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Compiled for those interested in sulfuric anhydride for fundamental research, product development or industrial production. Includes a description of the physical and chemical properties of Sulfan, correct procedures on handling and disposal, safety precautions, typical laboratory sulfonations, production of anhydrous HCl, fortification of spent acid with Sulfan and other helpful technical information.

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